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# Satellite Remote Sensing Cooperation in Support of the Amazon: the ACTO and the Leticia Pact

Dissertation to obtain a Master's Degree in Law, in the specialty of International and European Law

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Ewerton Luiz Lima De Marchi
Lisbon, 24 August 2020

"(...) dominava no projeto internacional a percepção da Amazônia como uma imensa unidade de conservação a ser preservada, tendo em vista a sobrevivência do planeta, devido aos efeitos do desmatamento sobre o clima e a biodiversidade. A base dessa percepção teve como origem, em grande parte, a tecnologia dos satélites, que permitiu pela primeira vez uma visão de conjunto da superfície da Terra e da sua unidade trazendo o sentimento da responsabilidade comum, assim como a percepção do esgotamento da natureza, que se tornou um recurso escasso (...) se há uma valorização da natureza e da Amazônia, há também a relativização do poder da virtualidade dos fluxos e redes do mundo contemporâneo, com a globalização, que acaba com as fronteiras e com os Estados."

Bertha K. Becker *in* the Monthly Conference of the
Institute for Advanced Studies
at the University of São Paulo,
on 27 April 2004.

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Although I accept that any flaws in this research are exclusively mine, I want to share the credits with the ones mentioned.

# Abstract

This study examines the introduction of the new Pact for the Amazon, so-called Leticia Pact, with a view to examining the establishment of new mechanisms for the protection and development of the region through the sharing of satellite remote sensing data and the interaction with the Amazon Cooperation Treaty Organization. To achieve this objective, the development of Space Law will be analysed in conjunction with the position of developing countries, especially the Amazonian ones, when drafting the space regulations in the second half of the 20th century, in particular the Remote Sensing Principles. To that end, the resolutions of the United Nations General Assembly on this topic will be examined. At the same time, the development of International Environmental Law and its interaction with space capabilities to ensure its effectiveness will be pointed out, through satellite images for a better environmental monitoring policy and its use for enforcement as evidence in the Court. After examining the background of both branches of international law, the scenario of Latin American regional cooperation to connect the Amazon region in the satellite remote sensing sector and the initiatives through the Amazon Cooperation Treaty Organization and the recent Leticia Pact will be analysed to recognize the cooperative stage in which the Amazonian states are, proposing, finally, the need to create a legal structure for space cooperation in the sharing of satellite data in order to strengthen the regional partnership and to create effective regional public policies.



**Keywords:** Cooperation; Remote Sensing; Space Law; ACTO; Leticia Pact.

# Resumo

Este estudo examina a introdução do novo pacto para a Amazônia, Pacto de Letícia, com vistas a examinar a criação de novos mecanismos de proteção e desenvolvimento da região pelo compartilhamento de dados de sensoriamento remoto por satélite e a sua interação com a Organização do Tratado de Cooperação Amazônica. Para tanto, será analisado o desenvolvimento do Direito Espacial em conjunto com a posição dos países em desenvolvimento, em especial os estados Amazônicos, quando da elaboração da regulamentação espacial na segunda metade do século XX, em particular dos Princípios de Sensoriamento Remoto. Para esse fim, serão examinadas as resoluções da Assembleia Geral das Nações Unidas sobre o tema. Paralelamente, será apontado o desenvolvimento do Direito Ambiental Internacional e a sua interação com as capacidades espaciais para garantir sua eficácia, por meio das imagens de satélite, para uma melhor política de monitoramento ambiental e seu uso como evidência nos Tribunais. Após examinar os antecedentes de ambos os ramos do Direito Internacional, o cenário da cooperação regional da América Latina para conectar a região Amazônica no setor de sensoriamento remoto por satélite e as iniciativas por meio da Organização do Tratado de Cooperação Amazônica e do recente Pacto de Letícia serão analisados para reconhecer o estágio cooperativo em que os estados Amazônicos se encontram, propondo, por fim, a necessidade de criação de uma estrutura legal para cooperação espacial no compartilhamento de dados de satélite com o objetivo de fortalecer a parceria regional e de criar políticas públicas regionais eficazes.

**Palavras-chave:** Cooperação; Sensoriamento Remoto; Direito Espacial; OTCA; Pacto de Letícia.

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# List of Abbreviations and Acronyms

| | |
|---|---|
| **ACTO** | Amazon Cooperation Treaty Organization |
| **ALADI** | Latin American Integration Association |
| **ALAS** | Latin American Alliance of Space Agencies |
| **ALBA** | Bolivarian Alliance for the Peoples of our America |
| **ANDC** | Amazon Network for Natural Disaster Cooperation |
| **ASETA** | Telecommunication Association of the Andean Community |
| **CAN** | Andean Community |
| **CARICOM** | Caribbean Community |
| **CBERS** | China-Brazil Earth Resources Satellite |
| **CNES** | Center National D'Études Spatiales |
| **COP** | Conference of the Parties |
| **COPUOS** | Committee on the Peaceful Uses of Outer Space |
| **DETER** | Real-Time Deforestation Detection System |
| **DMC** | Disaster Monitoring Constellation |
| **DMCii** | DMC International Imaging |
| **EO** | Earth Observation |
| **ERTS-A** | Earth Resources Technology Satellite-A |
| **ESA** | European Space Agency |
| **GEO** | Geostationary Synchronous Orbit |
| **GHG** | Greenhouse Gas |
| **GIS** | Geographic Information System |
| **GMES** | Global Monitoring for Environmental and Security |
| **INPE** | Brazilian National Institute for Space Research |
| **IPEA** | Brazilian Institute for Applied Economic Research |
| **ITU** | International Telecommunication Union |
| **LAFTA** | Latin American Free Trade Association |
| **LASA** | Latin American Space Agency |
| **MARPOL** | International Convention for the Prevention of Pollution from Ships |
| **MDG** | Millennium Development Goals |
| **MEA** | Multilateral Environmental Agreements |
| **MERCOSUR** | Southern Common Market |
| **MRV** | Measuring, Reporting and Verifying |

| | |
|---|---|
| **NACA** | National Advisory Committee for Aeronautics |
| **NASA** | National Aeronautics and Space Administration |
| **NDC** | Nationally Determined Contribution |
| **OAS** | Organization of American States |
| **OOSA** | Office for Outer Space Affairs |
| **OST** | Outer Space Treaty |
| **RED** | Reducing Emissions from Deforestation |
| **REDD+** | Reducing Emissions from Deforestation and forest Degradation, plus the sustainable management of forests, and the conservation and enhancement of forest carbon stocks |
| **Rio+20** | United Nations Conference on Sustainable Development |
| **SA-SGW** | South American Space Generation Workshop |
| **SASA** | South American Space Agency |
| **SDG** | Sustainable Development Goals |
| **SELPER** | Latin American Society of Remote Sensing Specialists |
| **SES** | New Skies Satellites, B.V. |
| **SPOT** | Satellite Pour l'Observation de la Terre |
| **SSTL** | Surrey Satellite Technology Ltd |
| **UN** | United Nations |
| **UNASUR** | Union of South American Nations |
| **UNEP** | United Nations Environmental Programme |
| **UNFCCC** | United Nations Framework Convention on Climate Change |
| **UNGA** | United Nations General Assembly |
| **UNISPACE** | United Nations Conference on the Exploration and Peaceful Uses of Outer Space |
| **US** | United States of America |
| **USGS** | United States Geological Survey |

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# Introduction

In 1946, the first photo was captured from outer space.[1] Shortly thereafter, the term "remote sensing" is introduced in the specialized literature, used to define the acquisition of information without physical contact with objects. In the last decades, the world has been marked by the intensification of the importance of space activities and services in the countries' economic and social development process, such as satellite remote sensing.

During the second half of the 1900s, in the scenario of the Cold War and the space race, faced by the vulnerability and insecurity with threats of a new world conflict coming from outer space, the US and the USSR agreed that the brand new space issue was to be discussed and regulated within the United Nations. This was the climate in which the space age was inaugurated, and the bases of space law began to be laid, whereas states engaged in international cooperation around the peaceful use and exploration of outer space.

In parallel with the development of international regulation of activities conducted in outer space, the environment also became a target of discussions at international level due its cross-border nature. International environmental law is also born, derived from a process of expansion of modern international law, which deals not only with borders, like classic international law, but also with common problems, a typical process of a period of globalization of law. It arose the idea that the planet is ecologically interdependent,[2] and that humankind has a collective interest in it.

Nature doesn't respect political boundaries, but each country has its own policies on how to protect it. States started legislating on the recognition on the environment as a subject of law. In 2018, the Supreme Court of Colombia declared

1 Space Center Houston, *On this day in space history, the first photo is taken from space*, 2019.
2 DABELKO, G., CONCA, K., 2014, Part II, no 9.

that the Atrato River, part of the Colombian Amazon, a legal subject to rights of protection, conservation, maintenance and restoration by the state and the ethnic communities that comprise it.[3] In addition, Ecuador amended its Constitution to uphold the inherent rights of nature,[4] while Bolivia also recognizes nature's rights through two national laws.[5] In the same direction, at Rio 92 Conference, the Amazon region emerged as a territory of global relevance, in particular due to its function of balancing the temperature of the planet, being considered as the "lungs of the world". The region is too important to be left for each Amazonian country to do as it pleased.

The Amazon region encompass eight countries plus an oversees territory, which are finding ways to cooperate. There is an institutional framework in which states have been doing this: the ACTO, that could be streamlined more effectively to promote cooperation for environmental protection. Despite achievements were obtained, especially on transfer of knowledge and coordination to process satellite data, the organization still lacks the relevance it should have. On September 2019, seven countries came together to sign the new agreement for the Amazon, so-called Leticia Pact, excluding Venezuela and French Guiana (France), bringing new commitments to the environmental agenda, taking into consideration the role of satellite data for the exchange and coordination of information to better policies.

In order to protect and preserve natural resources, satellite remote sensing technology through its satellites imagery has proven effective "to assist policy makers, governments, researchers, and other relevant users in proposing and implementing more effective solutions and, subsequently, to assess the results of these applications"[6]. Satellites can be indicated as the main axes of space activity by providing support for national defence, as well as increase the understanding of the universe through its application in scientific research.

[3] STC4360-2018, *The Atrato River Case*, Supreme Court of Colombia, 2018.
[4] ECUADOR, *Constitución del Ecuador*, Art. 71. *La naturaleza o Pacha Mama, donde se reproduce y realiza la vida, tiene derecho a que se respete integralmente su existencia y el mantenimiento y regeneración de sus ciclos vitales, estructura, funciones y procesos evolutivos.*
[5] VIDAL, J., *Bolivia enshrines natural world's rights with equal status for Mother Earth*, The Guardian, 2011.
[6] ITO, A., 2011, p. 3.

Currently, outer space is no longer restricted to the bipolar disputes of the space race and is now considered a common good, due to its potential to respond various challenges faced in the 21st century. However, nations with strong economies and robust scientific systems are mostly the same as those at the forefront of the development of the space sector, with a few exceptions. Nonetheless, during negotiations at the United Nations, the need for cooperation was highlighted and it was called into attention the interest and needs of developed countries for the use and exploration of space.

## *I- Approach of the study*

The main interest of this research is to analyse the new regional cooperation agreement for the Amazon, the so-called Leticia Pact, and its implementation, taking into account the need for space cooperation in satellite remote sensing in conjunction with a proposal on a data sharing policy for its effectiveness. Therefore, the gaps and achievements brought by ACTO during the last years will also be examined, providing background information with an overview of the topic.

The problem that led to the research was to investigate if the Leticia Pact brought some new international environmental commitments for the signatories' states that have the capacity to boost the regional space sector, especially the satellite remote sensing market and its satellite data policy, leading the Amazonian countries to enact some of space regulation. The region has several factors that bring its countries closer together, but it is still taking slow steps in space cooperation.

A comprehensive review of the development of space law as well as the current legal framework around remote sensing by satellite will be conducted, identifying the challenges imposed on developing countries as sensed states, as well as the need to update this regulation. In parallel, the development of international environmental law will be analysed, through multilateral environmental agreements (MEA), where

states recognize the protection of the environment as a global issue, especially on what concerns the Amazon Cooperation Treaty and the brand-new Leticia Pact.

The method used to carry out this study is mainly based on the literary review of United Nations General Assembly resolutions, as well as MEA, with special attention to the ACT, the Leticia Pact and its Action Plan. The strategy of the Latin American countries is analysed, focusing on the Amazonian countries, in the international discussions of these two themes, as well as their strategy to cooperate on regional level.

The study is structured in four chapters, in which the following points will be analysed: Chapter 1 seeks to frame the development of international space law in parallel with the geopolitical background at the time of its development. The legally binding and non-binding rules will be analysed, as well as the general principles that govern this new branch of law, especially the status of space law. Attention will be given to the performance of developing countries in the construction of principles, binding rules and resolutions, with a view to make outer space accessible for all.

Chapter 2 starts with an overview on satellite remote sensing activities and its benefits for humankind, such as the challenges faced by the lack of regulation. The legal analysis relies in the examination on the international negotiations which resulted in the Resolution 41/65, as well as the current perspectives to establish a new legal regime. The standpoint of developing countries on sovereignty issues related to satellite data is the point of discussion from the negotiations until nowadays. On national level, data policies and legislations are reviewed in order to check its discrepancy with the international commitments.

Chapter 3 analyses the arising of environmental protection as a global issue and the consequent development of international environmental law through multilateral environmental agreements, with special attention to the benefits that satellite remote sensing has to monitor these agreements, as well as the use of satellite imagery as evidence in Court.

Chapter 4 focuses on the regional cooperation encompassing space and the environment. It will be analysed how Amazonian countries gathered to protect its rainforest, mainly through the Leticia Pact and the Amazonian Cooperation Treaty. The effectiveness of both agreements will be examined as its approach to boost cooperation in monitoring by satellite remote sensing. The need for an additional Protocol to the Leticia Pact addressing a data sharing policy will be the point of discussion, demonstrating its challenges and current perspectives on further develop the space sector in conjunction with it.

# Chapter 1. Space Law

## 1.1 A branch of International Law

The United Nations Charter is a basic legal source of international law covering the obligations of Member States in order to maintain international peace and security and to promote well-being in all countries.[7] Despite the Charter did not mention space cooperation, international cooperation is its essence. Art. 1, para. 3 states that one of the purposes of the United Nations (UN) is "to achieve international cooperation in solving international problems of an economic, social, cultural, or humanitarian character (…)". The Charter also makes recommendations for the purpose of (…) encouraging the progressive development of international law and its codification (art. 13, para. 1). In 1947, under this article, the United Nations General Assembly (UNGA) established the International Law Commission for the task of international law codification, but due to demands for technicality and specialization, other bodies could be entrusted with the same task. It was what happened when new topics arose in international law, including the exploration and use of outer space.

On 4 October 1957, with the launch of SPUTNIK I, the world's first artificial satellite, mankind first enters the space age.[8] With this launch, a space race between the Soviet Union and the United States (US) begins. This event directly influenced the US Congress to approve the National Aeronautics and Space Act of 1958,[9] thus creating the National Aeronautics and Space Administration (NASA), that succeeded the National Advisory Committee for Aeronautics (NACA). On 3 November the same year, the Soviet Union launches SPUTNIK 2 with the first living passenger aboard, the dog Laika.[10] On January of the following year, EXPLORER 1, the first satellite with an onboard telemetry system, is launched by the US into orbit aboard a

7 United Nations, Charter of the United Nations, 24 October 1945.
8 GERSCH, C., *1957: Lançamento do Sputnik*, DW, https://p.dw.com/p/2iWt (accessed 4 May 2020).
9 NASA, National Aeronautics and Space Act of 1958 (Unamended).
10 DOHRER, E., 2017.

Juno rocket and returns data from space.[11] On 1959, NASA's Explorer 6 launches and provides the first photographs of the Earth from space.[12]

Within the development of outer space activities crossing transnational boundaries and in recognition of a threat of militarization of outer space, US, USSR, and the other states considered the need to regulate the use and exploitation of this new geographical frontier. The landmark for this scheme was the setting up of an *ad hoc* committee to address legal issues raised by the growing space activities in the middle of the cold war. Later, the Committee on the Peaceful Uses of Outer Space (COPUOS) was established in 1959, under the auspices of the UNGA Resolution 1348 (XIII), consisting of a permanent body, with technical, scientific and legal responsibilities, supporting the multilateral discussion on the subject.[13]

Within COPUOS there was a wide impetus for the development of international space law. The Committee is responsible for reviewing international cooperation in the peaceful use of outer space.[14] HOWELL (2016) defines the organ as "the force behind the five treaties and principles that govern much of space exploration".[15] COPUOS has two subsidiary bodies: the Scientific and Technical Subcommittee and the Legal Subcommittee.

In 1961, Resolution 1721 (XVI) was the starting point for the development of space law, recommending that "in the exploration and use of outer space, states should be guided by the following principles: a) International law, including the UN Charter, applies to outer space and celestial bodies"; and "outer space and celestial bodies are free for exploration and use by all States in conformity with international law and are not subject to national appropriation".[16] In addition, the resolution persuades states to inform COPUOS, through the UN Secretary-General, of their

11 Space Staff, *Timeline: 50 Years of Spaceflight*, 2012.
12 Ibid.
13 UN Doc. Resolution 1348 (XIII), 1958.
14 UN Doc. A/RES/74/82; By the year of 2020, COPUOS comprises ninety-five Member States, including seven of the nine Amazonian countries.
15 HOWELL, E., *Who owns the moon?*, 2016.
16 UN Doc. Resolution 1721 (XVI), 1961.

launches for orbital flights, and the Secretary-General to create a public register with information provided by States on their space launches.

In 1962, the UN established the Office for Outer Space Affairs (OOSA), which is responsible for promoting international cooperation for the peaceful use of space, guaranteeing secretariat support to COPUOS, and also functioning as a lever for the implementation of international space law, where the paradigmatic example is the supervision of the registration of space objects launched into space. The maintenance of a register was previously responsibility of the UN Secretary-General, but it was delegated to the OOSA.

It is in this context, of increasing interest in space activities and in close collaboration with the states, that several legal documents have been drawn up giving rise to a harmonization of the *corpus iuris spatialis*.

The term "Space Law" refers to all international agreements, treaties, conventions, normative acts and regulations of international organizations, national laws, internal regulations, executive and administrative orders and court decisions that are applicable to space matters.[17] International space law can be defined as a "new branch of public international law created to establish the specific legal regime of outer space and celestial bodies (with the exception of Earth), and to order the activities performed by human beings in the new environment",[18] consisting of two layers of laws and regulations, which are the international law that regulates rights and obligations of States and intergovernmental organizations in outer space, and a second layer comprising the national law, complementing the deficiency of international legislation to some extent.[19]

When it comes to international space law, the principles contribute to the application of international law and cooperation among states, proving to be decisive in the development of a body of rules. In this sense, crucial UNGA resolutions in the space domain are the Resolution 1962 (XVIII) entitled "Declaration of Legal

17 FRAZÃO, J., 2015, p. 2.
18 MONSERRAT FILHO, J., 2014.
19 MA XINMIN, 2014.

Principles Governing the Activities of States in the Exploration and Uses of Outer Space" known as the Declaration of Legal Principles, adopted in 1963,[20] and Resolution 1884 (XVIII), adopted in the same year, which urges states to refrain from placing any objects carrying nuclear weapons or any other type of mass destruction weapon in orbit and to install such weapons in celestial bodies.

The Resolution 1962 (XVIII) is particularly relevant, since it came to establish the nine principles that guides the Treaties which emerged in the following years:

1) Principle of exploration and use of outer space in favour of all mankind;

2) Principle of equality in the free exploitation and use of resources and in accordance with international law;

3) Principle of non-appropriation of outer space and celestial bodies;

4) Principle of compliance with international law, including the UN Charter, in the interest of maintaining international peace and security and promoting international cooperation and understanding;

5) Principle of the international responsibility of states for the national activities of governmental and non-governmental organizations, which must ensure the supervision and execution of these activities. As for the activities of non-governmental entities in outer space, they must be authorized and constantly monitored;

6) Principle of cooperation and mutual assistance of states in the exploration and use of outer space;

7) Principle of jurisdiction and control of the space object launched into outer space, as well as any personnel thereon, while in outer space;

8) Principle of international liability for damage caused to another state or to natural or juridical persons, by the state that launches a space object into space or that in whose territory or facilities the launch took place;

[20] UN Doc. Resolution 1962 (XVIII), 1963.

9) Principle of aid and assistance by states to all astronauts sent in outer space, in the event of an accident, danger or forced landing in the territory of a foreign state or on the high seas.

Although the Resolution is not legally-binding, it was the first time that states reached a consensus on the principles that should govern outer space. The legally binding regulation of space activities starts in 1967, with the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies as known as the Outer Space Treaty (OST).

The Declaration of Legal Principles is the starting point when drafting the main guidelines for the OST, having its presence in the preamble.[21] The Treaty itself is considered a "codification of the principles of customary international law" that are part of the Resolution.[22]

The OST serves as the foundation of international space law, opening the period of production of binding norms of space law. The body of international space law is considered to be what is concentrated and extracted from the following documents. In total, there are 5 treaties:

1) Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, known as the "Outer Space Treaty", from 1967;[23]

2) Agreement on the Rescue of Astronauts, the Return of Astronauts and Return of Objects Launched into Outer Space, known as the "Rescue Agreement" from 1968;[24]

[21] FRAZÃO, J., 2015, p. 2.
[22] SCHARF, M., 2013, p. 134.
[23] Adopted by the UNGA in its Resolution 2222 (XXI), opened for signature on 27 January 1967, entered into force on 10 October 1967.
[24] Adopted by the UNGA in its Resolution 2345 (XXII), opened for signature on 22 April 1968, entered into force on 3 December 1968.

3) Convention on International Liability for Damage Caused by Space Objects, known as the "Liability Convention", from 1972;[25]

4) Convention on Registration of Objects Launched into Outer Space, known as the "Registration Convention", from 1976;[26]

5) Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, known as the "Moon Agreement", from 1984.[27]

In addition, on one hand, several authors considered the Partial Test Ban Treaty[28] from 1963 as part of the *corpus juris spatialis*, besides the treaty did not address issues only in outer space but also the Earth's atmosphere and the oceans.[29] On the other hand, OOSA considers the five international treaties listed above as part of the space law body.

However, international space law is also a constellation of values, declarations and principles related to space activities and the use of resources in outer space, such as the following:

1) Declaration of Legal Principles Governing the Activities of States in the Exploration and Uses of Outer Space, known as the "Declaration of Legal Principles", from 1963;[30]

2) The Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting, known as the "Broadcasting Principles", from 1982;[31]

3) The Principles Relating to Remote Sensing of the Earth from Outer Space, known as the "Remote Sensing Principles", from 1986;[32]

25 Adopted by the UNGA in its Resolution 2777 (XXVI), opened for signature on 29 March 1972, entered into force on 1 September 1972.
26 Adopted by the UNGA in its Resolution 3235 (XXIX), opened for signature on 14 January 1975, entered into force on 15 September 1976.
27 Adopted by the UNGA in its Resolution 34/68, opened for signature on 18 December 1979, entered into force on 11 July 1984.
28 Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water (hereafter Partial Test Ban Treaty), Moscow, done 5 August 1963, entered into force 10 October 1963.
29 VON DER DUNK, F., 2012.
30 UN Doc. Resolution 1962 (XVIII), 1963.
31 UN Doc. Resolution 37/92 (1982).
32 UN Doc. Resolution 41/65 (1986).

4) The Principles Relevant to the Use of Nuclear Power Sources in Outer Space, known as the "'"Nuclear Power Sources" Principles", from 1992;[33]

5) The Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries, known as the "Benefits Declaration", from 1996.[34]

Thus, also belong to the *corpus juris spatialis* these five declarations and legal principles developed under the auspices of the UN, since they establish guiding principles for the conduct of states in space exploration.

The shaping of space law is a phenomenon that occurred against the current process of specialization in the areas of international law. If, in general, each state legislates on a particular subject, to subsequently meet with other sovereign entities for the conclusion of an international agreement, with the space regime the exact opposite happened: first came international law, with resolutions and treaties under UN auspices, for later states themselves to take these international standards into account, to regulate this new legal dimension in their domestic legal frameworks.[35]

### *1.1.1 Legal status of International Space Law instruments*

International law can arise from several sources:[36] a) customary international law; b) conventional international law; c) general principles widely adopted in national laws.[37] Basically, the same occurs with international space law, where the sources are the general principles of international law – UN Charter –, customs, the principles set out in the OST, and the special norms of International Space Law, adopted in universal, regional or bilateral conventions and agreements.[38]

33 UN Doc. Resolution 47/68 (1992).
34 UN Doc. Resolution 51/122 (1996).
35 SANTANA, D., LIENDO, L., 2017.
36 BUERGENTHAL, T., MURPHY, S., 2008.
37 The sources of international law universally accepted are listed in Article 38 of the Statute of the International Council of Justice, coming into force together with the Charter of the United Nations.
38 Ibid.

From this perspective, a discussion point arises in art. 3, OST implying that "international treaties with universal applicability and customary international law are complementary to space law". In fact, when confronting international space law with international law, the specific regulation should prevail, according to the maxim "*lex specialis derogat legi generali*". However, when conducting space activities, states are under space law, but also to general international law. The UN Charter, in its art. 103, states that between obligations under the Charter and under any other international agreement, shall prevail obligations under the Charter. Thus, the application of space law is inferior to the Charter, but it prevails over other general international legislation.[39]

The Magna Carta of international space law is the OST, providing a regulatory framework for activities related to outer space, as well as establishing the bases for the development of space legislation. It should be noted that among space treaties there is a logical sequence of thematic progression. The OST contains the provision on astronauts (article V, OST), which unfolded the codification process that culminated two years later in the Rescue Agreement. The same occurs in the Liability Convention, where there is a mention in articles VI and VII of the OST. It is also referred from the article VIII, OST, the registration of an object launched into outer space, that is directly and indirectly contemplated in the 1968 and 1972 Conventions. Finally, the scope of states' actions on the Moon was not excluded from the previous conventions.

The OST is technically a binding norm for the signatory states, following the dictum of *pacta sunt servanda*. This implies that it operates between "signatories and ratifiers". In view of the respect for the principle of sovereignty of states and under the 1969 Vienna Convention on the Law of Treaties in its Article 53[40] and in its Article

[39] MA XINMIN, 2014.

[40] Article 53, 1969 Vienna Convention, *"*A treaty is void if, at the time of its conclusion, it conflicts with a peremptory norm of general international law. For the purposes of the present Convention, a peremptory norm of general international law is a norm accepted and recognized by the international community of States as a whole as a norm from which no derogation is permitted and which can be modified only by a subsequent norm of general international law having the same character*"*.

64[41], a state that does not adhere to instruments of international law would not be subject to these standards, considering them as mere *res nullius*. With this observation of the logic of the international legal system, there is fragility when the OST is not consolidated as an imperative norm – *jus cogens* –[42] of international law.

However, the main principle of the OST, namely the peaceful use of outer space, should be considered as *jus cogens*.[43] There is a consensus that the OST, although not universal, due to wide acceptance,[44] can be treated as customary law of outer space.[45] As a consequence, it can be legally binding, even in states that were not originally part of the Treaty or that have not yet acceded to it. The same occurs with the 1963 Declaration of Legal Principles that is considered the foundation to the OST, since it has been accepted by the international community as a whole, and it has the force of imperative norm of general international law.[46] The other four treaties are also legally binding.

Furthermore, due to the first years of development of space law regulation taking place in parallel with high geopolitical tension such as the Cold War and also the space race, the aim for binding regulation was to secure that emerging space activities would not get out of control.[47] Nonetheless, over the time, it became more complicated to discuss binding rules. Thus, the moment of binding rules moves to non-binding rules, giving rise to the UNGA Resolutions.

According to articles 10 and 14 of the UN Charter, the resolutions are referred as recommendations. The recommendatory nature of UNGA resolutions has been stressed by the ICJ.[48] Since it lacks such legally binding force, even when adopted by

41 Article 64, 1969 Vienna Convention, "If a new peremptory norm of general international law emerges, any existing treaty which is in conflict with that norm becomes void and terminates".
42 The principle of *jus cogens* is treated as a peremptory norm accepted by the international community and it is enshrined in the 1969 Vienna Convention in its Art. 53 and in its Art. 64.
43 MATCHANOVA, Z., 2009, pp. 141-143.
44 The OST was ratified by a total of 110 states and signed by 23 until 20 April 2020.
45 UN Doc. A/AC.105/C.2/2015/CRP.25.
46 MA XINMIN, 2014.
47 ESPI, Report 57, 2016.
48 VOITOVICH, S., 1994, p. 95.

consensus at UNGA, it marks the transition in the development of space legislation from "hard law" to "soft law".

In the view of the UN Office of Legal Affairs, "a declaration is a formal and solemn instrument, suitable for rare occasions when principles of great and lasting importance are being enunciated...".[49] In this sense, UNGA resolutions express the will of the states, simplifying the procedure for drafting Treaties. Although not legally binding, it is expected that the international community may respect them. This has been the experience of most resolutions relating to space activities and the treatment of outer space, which found relevant support from member states. The validity and strength of these resolutions depend on their substantive content and legal nuances, their lasting importance to the world community and the way in which the resolutions are adopted.[50] In addition, there is a certain robustness to the resolutions, since the UNGA has the option of referring any question to the Security Council for consideration and approving a binding resolution with sanctions.[51]

In conclusion, customs, treaties, general principles and the resolutions should not be analysed separately but together, since there is a close connection in which treaties and resolutions are not formed without customs and general principles. Likewise, the general principles are highly important as they have a constituent and interpretive role in defining the path that legal norms must take and the scope they have to reach. As seen, the foundation of international space law relies on its principles. As important as this combination is to fill the gaps on regulation and update the regulatory instruments, they shall not violate the principles and values. Although many results obtained under international space law are not legally binding, they ultimately serve as important guides for states and other actors to conduct activities in outer space, being extremely relevant to national space legislation.

[49] UN Doc. E/CN.4/L.610 (1962).
[50] SACHDEVA, G., *in* VENKATA RAO, R., GOPALKRISHNAN, V., and KUMAR A., 2017, pp. 7-26.
[51] In general, resolutions adopted by the Security Council acting under Chapter VII of the Charter, are considered binding, in accordance with Article 25 of the UN Charter.

## 1.2 Interests and Needs of Developing Countries

The most emblematic mention to the interests and needs of developing countries appear in the title of the Resolution 51/122 on "Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries", adopted by consensus at the UNGA, in 1996. But before its approval, a path was taken where the interests and needs of developing countries were discussed at UN Conferences and punctuated in resolutions and treaties.

During the second half of the twentieth century, the discussion on the exploration and use of outer space was a recurring theme on the part of the UN, even for the need to litigate for the peaceful ends of the use of resources in orbit, instead of the military ends of the cold war that gained strength. The role and recognition of the interests of developing countries in this journey was essential to develop multilateralism in space.

In this context, the third session of the Scientific and Technical Sub-Committee of the COPUOS, in 1964, came up with a proposal to hold a UN Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE).[52] In total, three global UNISPACE Conferences were held to engage states and international organizations in order to increase international cooperation, with particular regard to the benefit of developing countries.

Meanwhile, in 1967, came into force the main source of space law – OST – not mentioning directly the developing countries, however, stipulating in its article 1 that: "The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind", and "outer space, including the Moon and other celestial

52 Congress of the U.S., Office of Technology Assessment, UNISPACE 1982: A Context for International Cooperation and Competition: a Technical Memorandum, 1983, p. 31.

bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality (...)".

In the first paragraph, there is a determination that space activities must benefit all countries and take into account the interests of all countries, whether developed or not from an economic and scientific point of view, establishing the "principle of common interest" for all humanity in space activities, proposed in the introduction of the treaty. In the second paragraph, the "principle of free access to space for all countries" is established, which can be interpreted as reinforcing the right of access of developing countries, emphasizing the demand for non-discriminatory treatment in relations between developing countries and developed countries.

One year after the OST came into force, UNISPACE I took place and had as one of its objectives *"*(a) an examination of the practical benefits to be derived from space research and exploration on the basis of technical and scientific achievements and the extent to which non-space Powers, especially the developing countries, may enjoy these benefits, particularly in terms of education and development; and (b) an examination of the opportunities available to non-space Powers for international co-operation in space activities, taking into account the extent to which the United Nations may play a role".[53] The Conference reviewed the progress in space research and called for increased international cooperation, with particular regard to the benefit of developing countries, especially due *"*the fact of their complexity, expensive and specialized nature, space tools are known only to a few nations".[54]

The Conference also recommended the creation of the post of Expert on Space Applications within UNOOSA,[55] which in turn led to the creation, in 1971, of the UNOOSA Programme on Space Applications that implemented trainings and workshops throughout the 1970s, using space technology in such diverse areas as telecommunications, environmental monitoring and weather forecasting, remote

53 MATIGNON, L., *UNISPACE I in 1968*, Space Legal Issues, 2019.
54 Ibid.
55 UNOOSA website, *UNISPACE Conferences*.

sensing for disaster mitigation and management, agricultural and forestry development, cartography, geology and other resource development applications.[56]

The first time that the term "interests and needs of developing countries" is codified in space legislation is in the Moon Agreement in its art. 11, para. 7, (d). One of the main objectives of the Treaty, according to point 7, shall include "an equitable sharing by all states parties in the benefits derived from those resources, whereby the interests and needs of the developing countries (...)", enshrining the principle of benefit sharing, allowing developing countries to benefit of space resources, alongside developed countries with technological and financial means to promote the exploration of the Moon, preventing the use of these resources to increase the gap between developing and developed countries in the sector.

In 1982, at the second UNISPACE Conference, summoned largely by the interest of developing countries,[57] there was a greater approach to strengthening promotion of international cooperation by the UN, with a view to enable developing countries to benefit from the peaceful uses of space technology. The Conference addressed the importance of maintaining outer space for peaceful purposes and to develop initiatives for helping developing countries improve their access to space science technology and applications, in particular the benefits of using the geostationary orbit and its frequencies.[58] The Conference recognized that positions in the geostationary orbit and their frequencies are unique resources and that optimizing their use requires "planning and/or organization" capable of taking into account present and future needs and, specifically, the needs of developing countries.[59] In addition, UNISPACE II strengthened the UNOOSA Space Applications Program, increasing opportunities for developing countries to participate in educational and training activities in space science and technology and to develop their indigenous capabilities in the use of space technology applications.[60]

56 UN Doc. A/7285 (1968), Agenda item 24.
57 MONSERRAT FILHO, J., 2014.
58 Ibid.
59 UN Doc. A/CONF.101/10 (1982).
60 Ibid.

In the same year of 1982, UNGA Resolution 37/92 on the "Broadcasting Principles" was adopted, where the interests and needs of developing countries are cited on points on purposes and objectives[61], international cooperation[62], and copyright and neighbouring rights[63]

The Broadcasting Principles was supported by a group of developing countries, based on three principles, namely: (1) international direct television broadcasting as a contribution to the development of education and social and economic progress, especially from developing countries development; (2) special attention to the needs of developing countries in the use of this transmission to accelerate their national development; and (3) cooperation by states to protect copyrights and analogues with particular attention to the interest of developing countries in the use of international direct television broadcasting to accelerate their national development.

The resolution was not approved by consensus at COPUOS, submitted to vote at the UNGA without the support of developed countries. Resistance from developed countries was due to the opposition to the principle of prior authorization or consent for direct international television broadcasting.

The majority of developing countries defended the rule of prior consent as a way of safeguarding their sovereignty, preventing interference in their internal affairs and protecting their national values and cultural identity. The developed countries,

61 UN Doc. Resolution 37/92, A. Purposes and Objectives: 2. Such activities should promote the free dissemination and mutual exchange of information and knowledge in cultural and scientific fields, assist in educational, social and economic development, particularly in the developing countries, enhance the qualities of life of all peoples and provide recreation with due respect to the political and cultural integrity of States.

62 UN Doc. Resolution 37/92, D. International Cooperation 6. Activities in the field of international direct television broadcasting by satellite should be based upon and encourage international cooperation. Such cooperation should be the subject of appropriate arrangements. Special consideration should be given to the needs of the developing countries in the use of international direct television broadcasting by satellite for the purpose of accelerating their national development.

63 UN Doc. Resolution 37/92, H. Copyright and Neighbouring Rights 11. Without prejudice to the relevant provisions of international law, States should cooperate on a bilateral and multilateral basis for protection of copyright and neighbouring rights by means of appropriate agreements between the interested States or the competent legal entities acting under their jurisdiction. In such cooperation they should give special consideration to the interests of developing countries in the use of direct television broadcasting for the purpose of accelerating their national development.

although minority, contested this rule, based on the principles, in their view superior to all others, of freedom of expression and the free circulation of information.[64]

The principle of prior consent was also the subject of discussion during the preparations of the Resolution 41/65 on Remote Sensing Principles, from 1986. In this resolution there are two mentions of developing countries, in principles II and XII, which will be further discussed in the following chapter.

Finally, in 1996, Resolution 51/122 on "Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries" brings in its preamble that UNGA is "desirous of facilitating the application of the principle that the exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interest of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind". The Declaration suggests a new interpretation of para. 1 of art. 1 of the OST.[65]

Before reaching a consensus, a discussion was held between the developed and developing countries, where the latter managed to include the item "considerations on the legal aspects related to the application of the principle that the exploration and use of outer space should aim at the good and the interest of all States, taking in particular the needs of developing countries" on the COPUOS agenda in 1988.[66]

In 1991, nine developing countries[67] presented a working paper with the project entitled "Principles on International Cooperation in the Exploration and Use of Cosmic Space for Peaceful Purposes",[68] with the following main points: (a)

64 MONSERRAT FILHO, J., 2014.
65 OST, Article 1: (...) There shall be freedom of scientific investigation in outer space, including the moon and other celestial bodies, and States shall facilitate and encourage international co-operation in such investigation.
66 BENKO, M., SCHROGL, K., 1996, p. 183.
67 Brazil, Chile, Mexico, Nigeria, Pakistan, Philippines, Uruguay e Argentina.
68 UN Doc. A/AC.105/C.2/L.182 (1991); Argentina, Brazil, China, Mexico, Nigeria, Pakistan, the Philippines, Uruguay, and Venezuela presented a working paper containing a draft for 'Principles Regarding International Cooperation in the Exploration and Utilization of Outer Space for Peaceful Purposes'.

countries with outstanding space competence have special responsibility for promotion of cooperation in space science and technology and its applications; (b) countries with space programs "must allow access, to the knowledge and applications resulting therefrom, from other countries, in particular from developing countries, through cooperation programs designed for this purpose"; (c) developing countries should have special treatment, since it should be given preference in programs for the dissemination of scientific and technological knowledge, and it should not be required to be reciprocate; (d) states should promote the exchange of materials and equipment for the use and exploration of space and the transfer of their technologies under fair and equitable conditions of price and payment.

In contrast, developed countries did not agree to even discuss the proposal, as developing countries pursued unacceptable goals such as "forced cooperation", "automatic transfer of financial and technological resources from the north to the south", and a "redistributive revolution in international space cooperation".[69]

In 1993, the group of developing countries remade its proposal, seeking to make it acceptable to developed countries. Among the changes, the term "special responsibility" to promote cooperation in space science and technology and its applications" was replaced by "must contribute". In addition, a topic of interest to developed countries was added: "States are sovereign to decide the modalities of their cooperation, taking into account the solidarity and equity that must prevail in the exploration and use of outer space for peaceful purposes, as the task of all of humanity, especially in the framework of multilateral cooperation".[70] Finally, the development of the internal jurisdiction of all countries was maintained as the "main objective" of space cooperation.

In 1995, a counterproposal was presented by France and Germany containing the draft of the resolution, consisting basically in the freedom to determine international cooperation and that states can choose the most appropriate mode of

[69] BENKO, M., SCHROGL, K., 1996, p. 183.
[70] UN Doc. A/AC.115/C.2/L.182/Rev. 1.

cooperation to allocate their resources.[71] Developing countries presented a more conciliatory revision of its proposal. The merging both texts – representatives from Germany, France and Brazil prepared a joint project – was finalized in the plenary session of the main Committee of COPUOS, resulting in the adoption of the resolution in 1996. [72]

The Benefits Declaration repeats articles 1 and 3 of the OST and reaffirms that "particular account should be taken of the needs of developing countries", as well as "particular attention should be given to the benefit for and the interests of developing countries and countries with incipient space programmes stemming from such international cooperation conducted with countries with more advanced space capabilities". The Declaration provides what considers the most appropriate line of action to be carried out in international cooperation, declaring in para. 5 that it "(…) should aim, inter alia, at the following goals, considering their need for technical assistance and rational and efficient allocation of financial and technical resources: (a) Promoting the development of space science and technology and of its applications; (b) Fostering the development of relevant and appropriate space capabilities in interested States; (c) Facilitating the exchange of expertise and technology among States on a mutually acceptable basis".

Upon adoption of the Declaration, COPUOS organized UNISPACE III in which all UN member states were invited to participate. In 1999, the Conference resulted in the Vienna Declaration on Space and Human Development[73] to address new challenges in outer space activities. The Conference outlined a wide variety of actions to protect the global environment and manage natural resources, increase the use of space applications for human security, development and welfare, protect the space environment, and increase developing countries' access to space science and its benefits.[74]

[71] UN Doc. A/AC.105/C.2/L.197.
[72] UN Doc. A/AC.105/C.2/L.182/Rev.2.
[73] UN Doc. A/CONF/184/6.
[74] Ibid.

In the UNISPACE III Report, a special recommendation on environment and remote sensing was:

> "Measures should be taken to maximize the benefit of remote sensing systems through increased availability and affordability of data and information products; improved provision of technical information, training and financial support for developing countries in order to assist in decision-making and the use of remote sensing data and derived information in the development process; and improved coordination among ongoing and planned programmes and initiatives to eliminate duplicated efforts and to identify gaps."[75]

In 2003, Brazil, still dissatisfied with the formulation of remote sensing principles, called for more regulated legislation submitting a working paper to UNGA on "Why is an international convention on remote sensing of the Earth from outer space necessary?"[76] addressing that "many satellite remote sensing activities are not yet subject to international regulation" and "responsibilities must be established for the use of remote sensing data, especially in relation to sensed States". In this sense, called "for coherence, harmony and effectiveness to the principles and norms regarding satellite remote sensing activities, in order to prevent contradictory interpretations".

In 2004, COPUOS reviewed the implementation of the 33 recommendations of the third Conference.[77] Highlighted to this study, the proposed actions to enhance the capacity of developing countries in the development and wider use of Earth Observation (EO) technologies, including satellite remote sensing and geographic information system (GIS) were to develop an EO education and training Internet web portal and provide their EO data free of charge or at the lowest possible cost for educational purposes. The benefits expected include increasing opportunities to integrate substantive inputs from youth in capacity-building efforts in space-related areas as well as a better utilization of archived satellite images and increased access by developing countries to archived satellite images as basic material for space research and studies. The Member States with space agencies having remote sensing satellite capabilities were also encouraged to join and strengthen the International Charter

75 Ibid, p. 21.
76 UN Doc. A/AC.105/C2/L.244.
77 UN Doc. A/59/174.

"Space and Major Disasters"[78], so that remote sensing capabilities and applications could be more effectively used in supporting disaster management activities.

In 2018, fifty years after the first Conference, the international community came together again to reflect on decades of remarkable achievements in space and conclude with a global commitment to cooperate and use space for sustainable development.[79] Nearly 30 space agencies from all over the world, who delivered statements and underscored the broad global interest in contributing to the Space2030 Agenda[80].

The path remains defending the use of space as a tool for sustainable development and to shape the global governance of outer space activities in order to benefit people and the planet today and for the next generations, taking into account the interests and needs of developing countries.

### *1.2.1 Geostationary Orbit discussion by developing countries*

In 1976, eight equatorial countries,[81] all developing countries, claimed sovereignty or exclusive rights over parts of the geostationary synchronous orbit (GEO) located above their territory through the Declaration of the First Meeting of Equatorial Countries (Bogota Declaration).[82] A GEO is a circular orbit of 35,785 km above Equator, particularly used for meteorological and communications satellites.[83]

The delimitation where starts outer space is not precise. On 13 October 1919, twenty-seven states signed the Paris Convention[84] bringing together the victors of the

78 The International Charter "Space and Major Disasters" is a non-binding charter which provides for the charitable and humanitarian retasked acquisition of and transmission of space satellite data to relief organizations in the event of major disasters.
79 UNOOSA website, *UNISPACE+50 concludes with global commitment to cooperate in space and use space for sustainable development*, 2018.
80 UNOOSA website, *Space2030: Space as a driver for peace*, 2018.
81 Colombia, Congo, Ecuador, Indonesia, Kenya, Uganda and Zaire; Brazil has signed the Declaration as an observer. Later, Gabon and Somalia joined the group.
82 Declaration of the First Meeting of Equatorial Countries (the Bogotá Declaration), 1976.
83 Geostationary orbit, The Editors of Encyclopaedia Britannica, 2020.
84 Convention Relating to the Regulation of Aerial Navigation, 1919.

First World War with the aim of establishing an international charter for the control and development of air transport on a worldwide scale, regulating air navigation.[85] This Convention was replaced in 1947 by entering into force the Chicago Convention[86]. Although it still does not exist a precise legal, technical or political definition concerning the boundaries that separates airspace from outer space, there are two legal different regimes to regulate both airspace and outer space. On the one hand, the Chicago Convention on art. 1 states that "every state has complete and exclusive sovereignty in the airspace above its territory". On the other hand, art. II of the OST affirms that "outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means".[87]

According to the Kármán line,[88] the boundary that separates air space from outer space is 100 km above sea level.[89] This line has been recognized by the *Fédération Aéronautique Internationale* and it is important for legal and regulatory measures, in view of the fact that aircraft and spacecraft fits in different jurisdictions and are subject to different treaties. For instance, the US Air Force and NASA define the limit to be 80 km above sea level.[90] Since 1967, the theme became a formal consideration at UNCOPUOS,[91] discussed during many decades and resulting in fruitless debates. Recently, in 2019, the Legal Subcommittee of UNCOPUOS reconvened its working group on the Definition and Delimitation of Outer Space.[92] BITTENCOURT NETO (2015) addresses that the "delimitation of outer space is also justified for safeguarding one of the most important Space Law principles, that is, the prohibition of national appropriation over outer space, including orbital positions and celestial

85 MATIGNON, L., *The Paris Convention of 1919,* 2019.
86 ICAO, Convention on International Civil Aviation – Doc 7300.
87 UN Doc. ST/SPACE/11/Rev.2 (2008).
88 This limit was designated as the Karman Line, in honour of Theodore von Kármán, who contributed greatly in the fields of aeronautics and astronautics. It was he who first calculated that approximately at this altitude, the density of the Earth's atmosphere became so low for aeronautical purposes that any vehicle at that altitude would have to travel at speeds greater than orbital speed (24,000 km/h) to achieve aerodynamic support. O'LEARY, L., *Handbook of space engineering, archaeology, and heritage, Advances in engineering*, 2009, p. 84.
89 CORDOBA, S., 2004.
90 VOOSEN, P., 2018.
91 UN Doc. A/C.1/SR.1492, Proposal made by France to the General Assembly in 1966.
92 UN Doc. A/AC.105/1112/Add.6 (2019).

bodies" and proposes that the solution for this still unsolved International Law problem "should preferably be achieved through a new international convention, at least by amendment or protocol to the Space Treaty or the Chicago Convention, in order to guarantee proper legal security".[93]

Nevertheless, what equatorials countries were claiming in the Declaration is much more than its airspace. The countries stated that "GEO is a physical fact linked to our planet because its existence depends exclusively on its relation to gravitational phenomena generated by the Earth, and that is why it must not be considered part of the outer space"[94] and it "is a scarce natural resource". Since the countries qualified GEO as a natural resource, the justification to have sovereignty over this orbital environment were based in UNGA Resolutions 2692 (XXV)[95] and 3281 (XXIV)[96].

The Declaration was inserted in the context where the international community was discussing the allocation of radio frequencies for outer space activities. In 1963, the International Telecommunication Union (ITU) held an Extraordinary Administrative Conference[97] where this theme was discussed due to the growth of outer space activities. The rule of the day for the distribution of orbital positions and their frequencies was the "first come, first served" defended by developed countries in the name of technological and economic efficiency in the use of a limited resource.[98] The developing countries argued that the orbital environment could end up monopolized by developed countries, if the rule were maintained. Developing countries also argued that the use of GEO in this sense is contrary to the principle of non-appropriation (art. II of the OST). Since then, developing countries

93 BITTENCOURT NETO, O., 2015, p. 74 and 98.
94 Declaration of the First Meeting of Equatorial Countries (the Bogotá Declaration), 1976.
95 UN Doc. A/RES/2693(XXV), "the right of the peoples and of nations to permanent sovereignty over their wealth and natural resources that must be exercised in the interest of their national development and of the welfare of the people of the nation concerned".
96 UN Doc. A/RES/3281(XXIV), Article 2 subparagraph (i): "All states have and freely exercise full and permanent sovereignty, including possession, use and disposal of all their wealth, natural resources and economic activities".
97 ITU, Extraordinary Administrative Radio Conference (Geneva, 16 August - 3 December 1951).
98 GOMEZ, C., CORDOBA, Y., 2013.

have never gave up reiterating this concern, which has grown, resulting in the proposal of a new principle: that of equitable access to the geostationary orbit.[99]

From the same principle of non-appropriation, the claim of the equatorial countries is inconsistent. After facing huge opposition, the equatorial countries modified their positions by claiming preferential rights over GEO, instead of sovereignty.[100] Finally, all claims were rejected, both by most countries and by the dominant doctrine.

In the year following the Bogota Declaration, ITU held the Conference materializing the new principle of equitable access to the GEO in the decision taken to not use the "first come, first served" rule, paving the way for a solution that would somehow meet the wishes developing countries. Two more recommendations on the topic were approved at the Conference in 1979: the first, formulating an appeal for the equal rights of all countries in the use of orbit/frequency resources, indicates that recording the frequency and its use do not give permanent priority to any state or group of states and cannot prevent the establishment of the space systems of other states; and the second, which convenes the 1985/88 ITU Conference, aiming at "ensuring in practice, for all countries, equitable access to the orbit of geostationary satellites and the frequency bands allocated to space services".[101]

The 1985/88 ITU Conference approved an allocation plan, allowing each state to satisfy its needs for the establishment of a national service, having ensured an orbital position, but at the same time maintained the "first come, first served" rule.[102] According to the decision, the new planning method should "guarantee in practice equitable access for all countries, considering the special needs of developing countries". Therefore, the 1985/88 ITU Conference represented the interests among developed and developing countries.

99 Ibid.
100 Ibid.
101 Final Acts, World Administrative Radio Conference, Geneva, 1979.
102 ITU, Conference Document 324 (1985).

Finally, the Constitution of the International Telecommunication Union (ITU), in 1992, mentioned the special needs of developing countries (Article 44), guaranteeing to these countries the access to orbit/frequency resources, defined as "limited natural resources", making effective the general principles governing the allocation and use of positions in the geostationary orbit and their respective radio frequencies. According to MONSERRAT (1999), this is probably the biggest victory for developing countries in the struggles to recognize their special interests and needs, but far from reaching the political and legal dimension that it seemed to have throughout the discussions.[103]

In 2000, the UN Legal Subcommittee, on the work of its thirty-ninth session, concluded that "the satellite orbits and radio frequency spectrum are limited natural resources, which must be used rationally, efficiently, economically and equitably"[104] and recommended, in accordance with art. 44 ITU Constitution, that "coordination is required between countries with a view to the utilization of satellite orbits, including the geostationary satellite orbit, the countries concerned take into account the fact that access to that orbit must take place, *inter alia*, in an equitable manner and according to the ITU Radio Regulations".[105] The UNGA endorsed this agreement by the Legal Committee in Resolution 55/122.[106]

103 MONSERRAT FILHO, J., 1999.
104 UN Doc. A/AC.105/738, Annex III (2000).
105 UN Doc. A/RES/55/122.
106 Ibid.

# Chapter 2. Aspects on Satellite Remote Sensing

## 2.1 Overview

As a precise definition, remote sensing is the process of measurement or acquisition of information of some property, or some object or phenomena, by a recording device that is not in physical or intimate contact with the object under study.[107] The OOSA referred to satellite remote sensing as "the science of gathering data about objects or areas from a distance. It is a tool frequently used to obtain details about the Earth's surface from space, as data is gathered by detecting and measuring electromagnetic waves emitted, reflected or diffracted by the sensed object".[108]

The current satellite remote sensing systems had their origin directly related to the needs of the two nations – USA and Soviet Union – during the Cold War. In order to spy foreign territories to a great extent, the Soviets authorized their ZENIT spy satellites in 1958, while the US approved their CORONA programme in the same year.[109]

In 1960, the first environmental satellite remote sensing – TIROS-1 – was launched as a part of NASA's program to figure out whether satellites could be useful for monitoring environment in order to develop a worldwide meteorological satellite information system.[110] Between 1965-1966, US Secretary of the Interior and the Director of the U.S. Geological Survey idealized a satellite remote sensing program with civilian purposes to gather information about the planet's natural resources.[111] [112]

[107] Definition by the American Society of Photogrammetry and Remote Sensing in PANDA, S. et al., Remote sensing systems – Platforms and sensors: Aerial, satellites, UAVs, optical, radar, and LiDAR, 2015, Chapter 1.
[108] UNOOSA website, *Remote Sensing*.
[109] MADRY, S., 2013, pp. 657–666.
[110] TIROS-1 was operational for only 78 days, but proved that satellites could be a useful tools for surveying global weather conditions from space.
[111] USGS website, *A Vision to Observe Earth*.
[112] NASA website, *Landsat*.

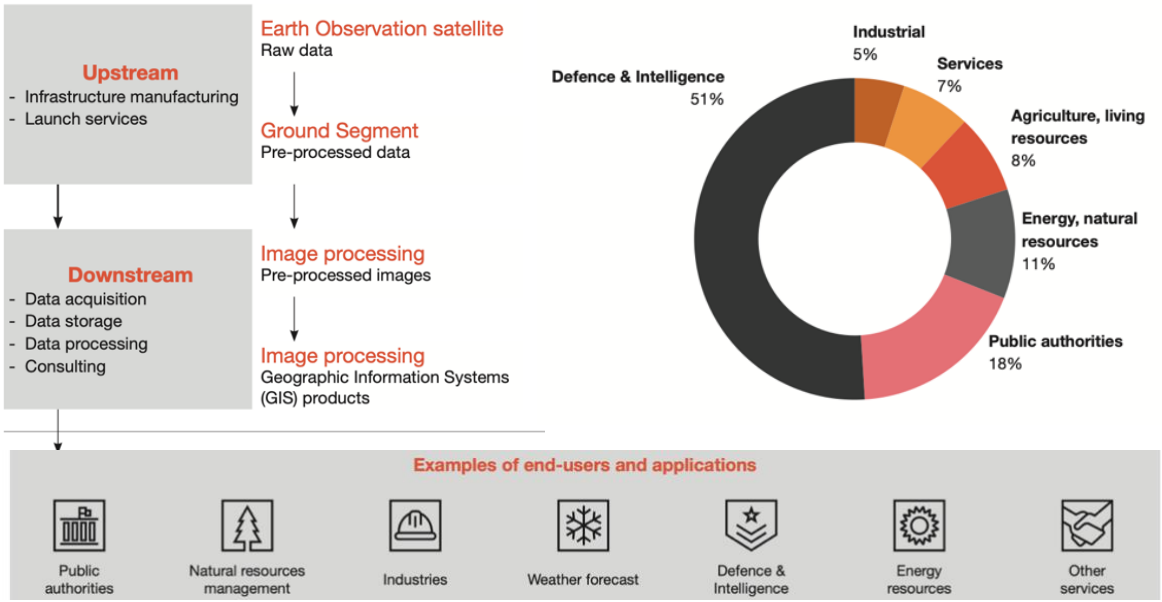
In 1972, US started its Landsat programme, first designated as the "Earth Resources Technology Satellite-A (ERTS-A)", intending to commercialize the remote sensing system and data dissemination.[113] This system was the first remote sensing program to commercially offer image data.[114] The monopoly of this market allowed its growth until the launch of the first French satellite (*Satellite Pour l'Observation de la Terre* – SPOT) in 1986, which started to offer data in the form of images with a resolution of 10 meters.[115] The Soviets came together shortly thereafter to offer images with a resolution of 5 meters obtained from their former military satellite systems, such as the KFA-1000 and MK-4.[116] As a result, satellite remote sensing progressed on a global scale.[117]

Satellite remote sensing has gone through many developments to the detection of radar and hyperspectral images, which can capture electromagnetic wavelengths outside the visible spectrum, making it possible to determine the height of an object up to a millimetre.[118]

Earth Observation (EO) data exploration market has had the highest annual growth potential of all space exploration markets, with an average rate above 13%.[119] High and very high-resolution data presents growth rates, driven by defense and intelligence markets.[120] (Figure 1)

113 Ibid.
114 CAMPBELL, J., 2007.
115 JOHNSON, J., 2003, p. 172.
116 FREESE-JONHSON, J., 2007.
117 OLSEN, R., 2016.
118 BEAM, C., 2019.
119 PwC website, *Growth potential of Earth observation*.
120 PwC, *Main Trends and Challenges in the Space Sector*, 2019.

**Figure 1. Segmentation of EO HR Market by industrial vertical applications**




Source: PwC, Main Trends and Challenges in the Space Sector, 2019, https://www.pwc.fr/fr/assets/files/pdf/2019/06/fr-pwc-main-trends-and-challenges-in-the-space-sector.pdf (accessed 13 April 2020).

The EO market is segmented in upstream and downstream services, from the launch services until the delivery of "analysed information". The research seeks to analyse mainly the challenges on the downstream service, where remains uncertainties concerning the use of the data acquired.

Considering the high level of detail that can be obtained through this technology, is great the concern of states sensed about their sovereignty, as well as citizens for their privacy. The growing expansion in satellite remote sensing services, as well as the effects on international and scientific cooperation need to be considered in an appropriate regulatory process in order to prevent any unilateral and/or arbitrary limitations adopted by the countries that control the technologies of the sector.

Satellite remote sensing accurately identifies environmental changes, providing timely and extremely useful information to the development of environmental policies and legislation on national level. Although the increasing use of remote

sensing may consequently strengthen regulations, the use of such data must be carried out with precaution and in compliance with peaceful purposes only.

## 2.2 Legal Aspects

Two main sources of space law dispose on satellite remote sensing activities: space law derived from international legal rules and space law derived from national legislation developed with its peculiarities in several countries. This section analyses the legal regime of satellite remote sensing in international level – Resolution 41/65 – and also on national level, such as national legislation and national policies focusing on sovereignty, access and distribution of data.

### *2.2.1 International Level*

In 1969, UNGA carried out the first international discussion on satellite remote sensing, requesting COPUOS to continue its studies in the development and the use of remote Earth resources surveying techniques in connexion with the framework of the UN system to identify possibilities of further international cooperation, and since these techniques are achieved, to make them available to both develop and developing countries.[121] The formulation of the Remote Sensing Principles began with a proposal by Argentina in 1970, which stated that prior consent from the sensed state was necessary before another state conduct any remote sensing activity over its territory.[122]

Due the main discussions on the general principles relied on rights of the sensing and the sensed state, it resulted in a clash between developed and developing countries, since the first group dominates remote sensing capabilities, differently from the last one which did not have such capabilities.[123] The issue was debated in the Legal Subcommittee of COPUOS for more than a decade, where on the one hand, developing countries were concerned with the protection of their sovereignty, the

121 UN Doc. Resolution 2600 (XXIV), 1969.
122 UN Doc. Resolution 1803 (XVII), 1962; UN Doc. Resolution 3171 (XXVIII), 1973.
123 VEGA, C., 2013.

prior consent to sense and the distribution of sensitive data collected over their territories. On the other hand, developed countries supported freedom of use and non-discrimination in the distribution of information obtained through satellite remote sensing.

It was not easy to come to a consensus on the scope of the principles and prohibition of the use of remote sensing data in detriment of the interests of the sensed state. Several proposals were presented in COPUOS, mainly for access and distribution of data, the condition for sensing, and responsibility concerning remote sensing activities.[124] In 1986, the discussions resulted in a gathering of principles.

#### *2.2.1.1 Resolution 41/65 on the Principles Relating to Remote Sensing of the Earth from Outer Space: negotiations, the final document and current perspectives*

The Resolution 41/65 on the Principles Relating to Remote Sensing of the Earth from Outer Space (Remote Sensing Principles) was adopted at the UNGA on 9 December 1986.[125] The principles established general regulatory standards of conduct for satellite remote sensing activities, by introducing duties and rights for sensing and sensed states. Its scope relies on civil remote sensing for the purposes of improving natural resources management, land use and the protection of the environment (principle I, "a"), with no regard to military purposes.[126] The UN played a fundamental coordinating role to regulate this activity. It also had an influence in reaffirming the application of the current rules of international law, with respect for the existing provisions in treaties such as the UN Charter, the OST, and the relevant ITU documents (principle III).

The resolution's general approach states that cooperation is essential in satellite remote sensing activities. The common good and the interest of all states, irrespective of their degree of economic, social or scientific and technological

[124] ITO, A., 2011, p. 47.
[125] UN Doc. A/RES/41/65 (1986).
[126] Ibid.

development, were considered as conditions of possibility for their exercise (principle II), and that needs of developing countries shall be taken into account. The principle affirms the cooperative nature of the activity, which is also provided in principles V, VI, VII (technical assistance), VI, VIII (cooperation and coordination).

In addition, in principles X and XI, solidarity and cooperation again guide these relations, providing that the sensing activity must promote the protection of the Earth's natural environment and humanity against natural disasters, so the state that has information about some phenomena harmful to the Earth's natural environment or likely to be affected by them, must transmit it to the affected states or those that may be affected. In relation to allow sensed states access to the information collected whenever required, principle IX states that the sensing state shall inform OOSA of its activities, based also on article IV of the Registration Convention and article XII of the OST. Moreover, civil liability to conduct these activities is also provided in principle XIV which recalls article VI, OST, applying to sensing states, irrespective of such activities are carried out by governmental or non-governmental entities or through international organizations to which such states are parties.

The main issues arise in relation with the sovereignty of sensed states, since satellite remote sensing activities can threat it due the possibility to obtain data and information on natural resources that can be used in detriment of their interests, such as "mining companies employing specialized companies to analyse spectral data of specific areas collected by the satellite constellations that circle the Earth to help them determine likely locations for mineral exploration and mining"[127]. It is seen that through information collected by satellites about natural resources that are not classified by the sensed state, large areas can be acquired by transnational corporations in detriment of their national interests, since these corporations will probably know more about the country's natural resources than the local government itself, putting authorities at a growing disadvantage when negotiating drilling rights or other agreements.[128]

[127] BAUMANN, J., 2020.
[128] FLORINI, A., DEHQANZADA, Y., 1999.

In this regard, principle IV advises that activities must respect the principle of full and permanent sovereignty with due regard to the rights and interests of all states so as not to detriment the rights and interests of sensed states. The central idea is that the activity should be carried out without prejudice to states that do not have capacity building in this domain. The sovereignty issue relies on the point comprising how the dissemination of data collected remotely would take place.[129]

During the negotiations on this point, in 1974, a joint proposal between the Soviet Union and France suggested that the data should be classified according to their resolution (spatial resolution greater than 50 meters would be classified as 'global' and would not be subject to restrictions imposed for detection and dissemination and the data with a resolution greater than 50 meters would be classified as 'local' and subject to control) and also required prior consent from sensed states.[130] The proposal linked the use of satellite data to state's sovereignty.

The same year, Brazil and Argentina proposed that "states parties shall refrain from undertaking activities of remote sensing of national resources belonging to another state party, including the resources located in maritime areas under national jurisdiction, without the consent of the latter"[131], imposing a prior consent from the sensed state. Both proposals are united by a common component: rules on data acquisition and its dissemination.

The Franco-Soviet proposal can be seen as an attempt to establish concrete data policies due the data classification requirements and the preferential treatment for availability, but this point of view was not agreed by the majority. However, the proposal led to the 1978 Convention on the Transfer and Use of Data of the Remote Sensing of the Earth from Outer Space (Moscow Convention)[132], where data dissemination rules were established, ratified by the socialist countries[133] at the time.

129 LINS, H., 1979.
130 UN Doc. A/AC.105/C.2/L.99 (1974).
131 UN Doc. A/AC/1/1047 (1974).
132 1978 Convention on the Transfer and Use of Data of the Remote Sensing of the Earth from Outer Space (entered into force in 21 August 1979).
133 Cuba, Czechoslovakia, the German Democratic Republic, Hungary, Mongolia, Poland, Romania, and the Soviet Union.

With the approval of the resolution 41/65 and the end of the Cold War, the convention was naturally discarded.

During the negotiations, rules regarding priority access to data and control over the dissemination of data under the analysed information were widely debated. In 1982, Brazil advocated for priority access to primary data by the sensed state before the access is granted to any other country when it comes to sensed states jurisdictions, while Chile addressed specific responsibility for the use of data, prohibiting the use of data in detriment of sensed states interests.[134] France, intending to develop its SPOT programme, unlike what it had jointly proposed with the Soviet Union, shifted positions to follow US perspective on the "Open Skies Police".[135]

In the end, the resolution did not grant any preferential right to the sensed state or even prior consent to sense, as it was the desire of developing countries when drafting the principle XII and XIII. Hence, sensed countries are treated like any other country with respect to data on its own territory. Conclusively, principle XII granted the right of sensed states to primary data, processed data and the analysed information relating to their territory under their jurisdiction, which shall be available in the domains of any other state participating in remote sensing activities on a non-discriminatory basis and at a reasonable cost, guaranteeing equality and the interest of the sensed states (taking particularly into account the needs and interests of the developing countries).

According to the principle of "non-discriminatory access", satellite remote sensing data: (a) must always be available, even if for sale – in which case it cannot be removed arbitrarily from the market; (b) it must always be available under equal conditions to all interested parties, in terms of right of use and price; (c) it cannot be offered as exclusivity to a single buyer; and (d) it cannot be sold at prices that hinder their purchase by the least developed countries.[136] This principle partially attends the fundamental issue raised developing countries as regards access by the sensed

134 ITO, A., 2011, p. 42.
135 UN Doc. A/AC.105/C.2/L.103 (1975).
136 MONSERRAT FILHO, J., 2014.

countries to data on their territories obtained by the sensing countries, in general developed countries.

However, the growing participation of non-governmental entities in satellite remote sensing activities, driven exclusively by commercial interests, reveal a potential threat to the concerns of sensed states, especially those in development, given the inability to interpret the data obtained with the sensing. Still, there is no convention defining satellite remote sensing data on international level yet. From this perspective, it becomes useless for sensed countries to have access to primary data if they are unable to process it.

Principle XIII excuses the mechanism of prior communication from the sensing state or the consent of the state when sensing and using information, in line with principles IV and XII. The state that performs satellite remote sensing shall, upon request by the sensed state, initiate consultations to allow its participation in these activities, to make available opportunities for participation (principle XIII) and enhance the mutual benefits to be derived therefrom, as already mentioned in principle XII.

From the resolution, the relation between the sensing and the sensed state is concluded in three points, according to TRONCHETTI (2015):

> Firstly, the sensing state has the right to observe another state's territory from space without the need to request an authorization to do so; in short, there is no rule of prior consent to being sensed. Secondly, the sensed state shall have access to the primary and the processed data of its territory on a 'non-discriminatory basis'; analysed information of its territory shall also be made available. This does not mean that access to data and information by the sensed state has to be free or automatic, just non-discriminatory and at 'reasonable' cost. Thirdly, even if data are shared, the sensed state needs to have mechanisms in place (expertise, people, hardware) to make use of them. Significantly, the sharing and selling of remote sensing data and information is regulated by 'data policies.'[137]

According to ITO (2011), since the resolution "is accepted unanimously, it is considered authoritative – if not universally recognized as a binding document".[138] However, UN Resolutions may vary according to the purposes and provisions of each

[137] TRONCHETTI, F., 2013, p. 16.
[138] ITO, A., 2011, pp. 55-56.

internal body, whether by the General Assembly or the Security Council. In the case of Resolution 41/65, approved by the UNGA, although there is no consensus on its legal binding nature, the symbolic impact in its formulation through a wide debate, tends to influence the behavior of member states, as defined CHENG (1997):

> "a specific resolution which, in clear, explicit, and unequivocal language, indicates that the intention is to proclaim what members of the General Assembly, without dissent, already accept as a rule of general international law may well be said to furnish adequate evidence that a new rule of general international law is in existence (…) In such cases, the binding force of the new rule is not derived from the resolution, but because it is accepted as law—as a rule of general international law—by the generality of States. However, in none of the General Assembly resolutions on outer space (…), is the wording found to be anywhere near to conveying such an intention. They are all essentially for the 'guidance' of States."[139]

With this same understanding, regarding the constant practice of political pressure on states by invoking resolutions, CASELLA (2011) clarifies that "a practice can develop and result after some time in the awareness that there is a legal obligation, which can give rise to customary law".[140]

The debates on the Remote Sensing Principles did not have an end in 1986, since the principles are in form of an UNGA Resolution. UNISPACE III, held in 1999, in Vienna, recommended, in its final report (para. 373), a review of the principles on remote sensing, with a view to their possible transformation into a treaty.[141]

On the same line, during the 42nd session of the COPUOS Legal Subcommittee, held in Vienna, from March 24 to April 4, 2003, Brazil submitted a working paper on "Why is an International Convention on Remote Sensing of the Earth from Outer Space necessary?" in order to show how the current regulation is outdate from both technological, economic and political point of view, understanding that it is necessary to draw up an international convention to update the principles and to develop standards on new situations resulting from technological innovations

139 CHENG, B., 1997, p. 136.
140 CASELLA, P. B., 2011, p. 191.
141 UN Doc. A/CONF.184/6 (1999).

in remote sensing activities and their commercial applications.[142] It is also emphasized that the operations of collecting, storing, processing and distributing the processed data do not generate potential damage, but rather the use of the analysed information, which may harm the sensed state.

Nowadays, as the advancement of technology already allows the recognition of individuals through high resolution images, issues on privacy may also be added. Perhaps it is time to revisit the Principles to further emphasize the regulation of satellite remote sensing activities to remove uncertainties, address urgent needs for clarification and establish a more comprehensive regime (ITO, 2008).

The idea of building a new Treaty or Convention based on the Remote Sensing Principles would not be new to COPUOS, as the OST was written based on the 1963 Declaration of Legal Principles. In this sense, two renowned experts formulated a proposal in two stages, where: (1) the Principles would be recast in a Treaty like they are today; and then (2) complementary protocols (to the Treaty of Principles) on specific topics, such as the commercial feature of remote sensing services and the principle of non-discrimination access to remote sensing data would be drawn up, taking into account the interests of the sensed countries.[143]

Currently, the lack of a binding norm in this matter leaves adrift the legal guarantees of respect to the principles, in confront with unilateral and arbitrary decisions mainly on data policies on national level by sensing states. In this regard, developing countries have reasons for supporting the enactment of a binding norm to regulate satellite remote sensing activities.

### *2.2.2 National Level*

As regards to national satellite remote sensing law and policy, not many states developed its own regulation on its services and on satellite data, even with the

142 UN Doc. A/AC.105/C.2/L.244, (2003).
143 BENKÖE, M., SCHROGL, K., 2001, pp. 283-284.

Resolution 41/65. This section analyses the different approaches on national policy and legislation in contrast with the international recommendation.

Several proposals to incorporate perspectives on data were not included into the resolution due the lack of consensus among states. The resolution fails to address operational issues related to the use and application of data, such as data policy issues, including intellectual property rights, guidelines for validating accuracy and data authentication, and liability issues.[144] Satellite data is defined in the first principle of Resolution 41/65 in three categories: 'primary data', which is the direct data transmitted to the ground stations; the 'processed data', that results from the primary data processed; and the 'analysed information' that means the interpretation of the processed data.

In this view, the resolution includes in principle VI that "states are encouraged, through agreements or other arrangements, to provide for the establishment and operation of data collecting and storage stations and processing and interpretation facilities, in particular within the framework of regional agreements or arrangements wherever feasible".

As it is seen, the Resolution 41/65 does not address the critical issues associated with the provision and use of data. National legislation is the concrete implementation of Article VI, OST requiring authorization and continuous supervision by the state party of national activities conducted by its non-governmental entities. Hence, national legislation comes as a means for a state to exercise control over these activities under its jurisdiction.

During the negotiations on the Remote Sensing Principles, US took the lead in legislating the matter on national level through the Land Remote Sensing Commercialization Act in 1984[145], due to its intention to commercialize its Landsat system. The Act stated on Section 103 (b) that "civilian unenhanced remote-sensing

144 ITO, A., 2011, p. 65.
145 US, Land Remote-Sensing Commercialization Act of 1984.

data be made available to all potential users on a non-discriminatory basis (…)", according to its Open Skies Policy.

The 1984 Act was replaced by the 1992 Land Remote Sensing Policy Act[146], which came up with conditions and requirements to operate satellite remote sensing activities, providing that no person subject to US jurisdiction or control may, directly or through any subsidiary or affiliate, operate any private space system without prior authorization (Section 201). It was also predicted that there will be no discrimination in the availability of the collected data except in the event of threatening national security (Section 501).

Although the Act basically serves the Landsat system (Title I), it established general procedures on the use of satellite remote sensing, making no mention to sensed states regarding the distribution of data related to their territories, due to its policy of non-discrimination of access to collected data. The only restriction applied to data disclosure was for national security or foreign policy reasons (Section 507).

In the Amazon region, although some space agencies – from Colombia and Peru – were established mainly to promote the development of remote sensing applications in order to tackle natural disasters and protect its rainforest, these countries do not have national legislation on the subject.[147]

In regard to Brazil, despite having one of the main remote sensing programs in the world in cooperation with China – China-Brazil Earth Resources Satellite (CBERS) – it does not have a specific legislation to regulate the activity. Brazil started by enacting the Decree 1,177 from 1971 on space operations for measuring, computing and recording territorial data with sensors, where the federal government had the monopoly on these activities.[148] The Decree was successively regulated,[149] until the concept of surveying from outer space emerged in relation to the aerial

146 US, Land Remote Sensing Policy Act of 1992.
147 OECD, 2011, p. 104.
148 Decree-Law no. 1.177, 21 June 1971, Provides for aerial surveys in the national territory, and provides other measures and Decree no. 2.278, 17 July 1997, that regulates Decree-Law no. 1.177.
149 Regulated by Decree no. 71,267 (1972); Decree no. 75,779 (1975) and Decree no. 84,557 (1980).

survey. From the new regulation, according article 11 (II), to conduct satellite remote sensing it was required an authorization from the Brazilian Armed Forces to "perform services from outer space through a ground station in the national territory to receive data captured by an orbital sensor".

In 1997, the Decree no. 2278/97, which is in force, was enacted to regulate the Decree no. 1,177, ignoring the nature of remote sensing and disregarding the Resolution 41/65, providing that national or foreign companies interested in distributing or using remote sensing data must require permission from the Brazilian Ministry of Defense. In practice, these companies are not complying with the legislation and it was not noticed any sanctions.

As regards to French Guiana, since it is a French overseas department, it follows the French regulation. Since 1986, France has maintained a civilian remote sensing program known as SPOT. The activity does not have specific regulations under French law, although the collection, analysis, transfer and distribution of data are governed by the principles and rules that guarantee freedom of information, communication, commerce and industry.

The collection and distribution of data are protected by the General Code of Local and Regional Authorities (*Code général des collectivités territoriales*) that proclaims the principle of freedom of trade and industry,[150] guaranteeing the exercise of the activity, as well as freedom of information (article 10 of the European Convention on Human Rights), as a consequence of freedom of expression from the art. 11 of the Declaration of the Rights of Man and of the Citizen of 1789, which has constitutional value, since it is listed in the preamble of the 1958 Constitution.[151] In addition, there are rules instituted from contracts signed between *Center National D'Études Spatiales*

150 *Code général des collectivités territoriales, Article L2221-1, Créé par Loi 96-142 1996-02-21, jorf 24 février 1996, Les communes et les syndicats de communes peuvent exploiter directement des services d'intérêt public à caractère industriel ou commercial. Sont considérées comme industrielles ou commerciales les exploitations susceptibles d'être gérées par des entreprises privées, soit par application de la loi des 2-17 mars 1791, soit, en ce qui concerne l'exploitation des services publics communaux, en vertu des contrats de concession ou d'affermage.*
151 ACHILLEAS, P., 2008, p.3.

(CNES) and 'SPOT Image' that guarantee access to the transmission and analysis data collected during satellite remote sensing.

As per the data policy in the Amazon region, INPE pioneered the free access to CBERS-2 satellite images in 2004, which was followed by the US and Europe in the following years.[152] In 2008, the US Geological Survey (USGS) made available all Landsat data. In 2009, the data policy principles of the Sentinel program were approved by the member states of the European Space Agency (ESA), establishing full and open access to data acquired by the upcoming missions.[153] The Sentinel missions were deployed specifically for the operational needs of the Global Monitoring for Environmental and Security (GMES) program.[154] In this programme, the data will be available for use in law enforcement in the area of the environment, so that public authorities can access it openly to develop public policy. However, due to national sovereignty issues, there is still concern that it may limit access to data, including by public authorities.[155]

This free distribution of satellite images fostered the creation and benefited companies in the geoinformation sector.[156] The purpose of this policy is to provide full, free and open data claiming to "stimulate development of the commercial market for unenhanced data and value-added services."[157] With "democratization" of satellite data, the fundamental matters are still defining policies in national level related to the control of data and sensing.

The main issue relies on the divergence of regulation by different states, as well as the lack of it. The absence of data regulation on international level is a dilemma, taking into account that "everything that is not prohibited is allowed"[158]. Moreover,

152 INPE website, *INPE atinge 1 milhão de imagens distribuídas sem custo pela internet. Mais de 70% são do satélite CBERS*, 2009.
153 ESA website, *ESA Member States approve full and open Sentinel data policy principles*, 2009.
154 Global Monitoring for Environment and Security is a European initiative for the implementation of information services dealing with environment and security. It will be based on observation data received from Earth Observation satellites and ground based information.
155 PURDY, R., LEUNG, D., 2012, p. 296.
156 Ibid.
157 US, US Land Remote Sensing Policy Act 1992.
158 S.S. Lotus (France v. Turkey), 1927, Permanent Court of International Justice.

it is seen that satellite remote sensing regulation is under national legislation, despite their unequivocal international character, constituting a clear anomaly.[159]

## 2.3 International Cooperation Model for Satellite Remote Sensing

Space cooperation models range from non-institutional to institutional. The selection of the suitable form to implement space cooperation laid on the consistent assessment of the conditions of the participant countries and the objectives of the space cooperation (MONROY, 2010). ESA is an example of institutional cooperation, developed through the years, relying on national institutions cooperation of its members and the political will to create a regional cooperation that led the ESA Convention. However, an institutional organization is not the better option for every type of cooperation. In this sense, the Disaster Monitoring Constellation (DMC) goes beyond the paradigm of institutionalizing international cooperation related to space.

### *2.3.1 The Disaster Monitoring Constellation*

The DMC was first proposed in 1996 by Surrey Satellite Technology Ltd (SSTL) to develop a remote sensing constellation based on the emerging EO capabilities of low-cost small satellites. The choice for small satellites aimed to meet a wide range of objectives affordably and in a timely manner.[160]

The DMC comprises a partnership between those responsible for constructing the satellites – STTL – and the operators: the Centre of Space Techniques through the Algerian Space Agency (Algeria), the Ministry of Science and Technology and Beijing LandView Mapping Information Technology Company Ltd (China), the National Space Research & Development Agency (Nigeria), the Science Board of Scientific and Technical Research Council (Turkey), and the British National Space Centre (UK). DMC provides Earth images for emergency alerts to the International

159 CHENG, B., 1997, p. 597.
160 STEPHENS, P. et al., 2002, pp. 525-535.

Charter on Space and Major Disasters[161], represented by the UK Space Agency on the Charter Board and by DMC International Imaging (DMCii)[162] in the Executive Secretariat. DMC is not an international organization and does not have regular bodies. It is a consortium that meets occasionally, where decisions are made by consensus among participating countries (MONROY, 2010).

The collaboration between the participating countries provided control over their own assets to meet specific national needs, encouraging participants to share resources to reap the benefits of operating the spacecrafts as a constellation in a way that each satellite is owned and operated by a single nation. By cooperating, they obtain daily images from around the world, greatly improving the capacity of their national space assets. The constellation plays a role in regard to capacity building by technology transfer programmes and the influx of satellite data.[163] The DMC is a model which demonstrates that it is possible to cooperate in space programs combining national goals to stimulate the development and providing additional benefits, such as risk sharing, as well as it displays what can be achieved with a relatively small programme when government departments and industry work towards a common goal.[164] The cooperation led to a long-term space strategy focused on economic development.

[161] The International Charter on Space and Major Disasters is a worldwide collaboration, through which satellite data is made available for the benefit of disaster management by combining EO assets from different space agencies, allowing resources and expertise for rapid response to major disaster situations.
[162] DMCii is the company that manages the Disaster Monitoring Constellation for the International Charter for Space and Major Disasters, subsidiary of SSTL.
[163] STEPHENS, P. et al., 2002, pp. 525-535.
[164] Ibid.

# Chapter 3. International Environmental Law

## 3.1 Overview

At the historical moment of the foundation of the UN, environmental issues were not on the international political agenda. This can be demonstrated by the fact that the provisions of the UN Charter did not mention it, not even its article 1, para. 3 and article 55.[165] However, despite its absence in the Charter, the nature of the UN commitments, in accordance with its purposes in Articles 1 and 55, has enabled it to develop its capacity in protecting the environment in the context of economic, social and humanitarian responsibilities.

In the 1960s, the civil society was characterized by the transformation of values and social models, and one of the concerns that became part of the public opinion agenda was the environment. Scientists reprehended serious environmental violations, corroborating for states and society as a whole to start paying more attention to the environmental issues.[166]

In 1962, the book Silent Spring, by Rachel Carson, took to the public space the debate about the pollution of natural resources, discussing issues regarding the limits of technological progress, the responsibility of science, as well as the relationship between humankind and nature, supporting the discussion on how human activity can harm the environment.[167]

165 UN Charter, Article 1: The Purposes of the United Nations are: (3) To achieve international co-operation in solving international problems of an economic, social, cultural, or humanitarian character, and in promoting and encouraging respect for human rights and for fundamental freedoms for all without distinction as to race, sex, language, or religion; Article 55: With a view to the creation of conditions of stability and well-being which are necessary for peaceful and friendly relations among nations based on respect for the principle of equal rights and self-determination of peoples, the United Nations shall promote: (a) higher standards of living, full employment, and conditions of economic and social progress and development; (b) solutions of international economic, social, health, and related problems; and international cultural and educational cooperation; and (c) universal respect for, and observance of, human rights and fundamental freedoms for all without distinction as to race, sex, language, or religion.
166 MONTANARI JUNIOR, I., 2011, p.81.
167 CARSON, R., Silent spring, 1962.

With the recognition that environmental issues are at a global level, the problems were likewise thrown into the international political discussion, as their repercussions go beyond states boundaries, to the point that only with the multilateral cooperation these problems can be mitigated, with the participation of all states.

As in the development of space law, the background for the progress of international environmental law was decisive.[168] From the 1960s, the gesticulation of states in search for a global regulation to the environment was exponential,[169] until 1968, UNGA, through Resolution 2398 (XXIII) approved the recommendation to convene an international conference on the human environment, resulting in the 1972 Stockholm Conference.

The Declaration of the Conference on the Human Environment, especially its principle 21, can be considered as a document with the same importance for International Law as UNGA Resolution 1962 (XVIII) that preceded the OST. In fact, both documents have fulfilled the role of true guides and parameters for defining the minimum principles that states shall follow in those areas.

Since the international legal system on the environment is still under development, the general principles of international environmental law have been enacted through the Multilateral Environmental Agreements (MEA) among states over the past few decades, playing an important role in solidifying the environmental rights in its preambles, by establishing general principles that facilitate the creation of a common environmental framework for global issues.

168 Prior to World War II, discussions on environment in international law relied on the theory that states had sovereignty over their natural resources, just as it does over its citizens, entities, and activities within their territory. Notwithstanding, in 1941, the decision on the Trail Smelter Case (USA v. Canada), stated that "under the principles of international law (…) no state has the right to use or permit the use of its territory in such a manner as to cause injury (…) in or to the territory of another or the properties or persons therein, when the case is of serious consequence and the injury is established by clear and convincing evidence." The decision is pointed out by a large part of the doctrine, as the first formal manifestation of international environmental law, regarding bilateral relations, and which would serve as a precedent numerous subsequent arbitration decisions.

169 The Council of Europe adopted two major texts, namely, the 'Declaration of Principles' on Air Pollution Control (8 March 1968) and the European Agreement on the restriction of the use of certain Detergent in washing and cleaning Products (16 September 1968); In Africa, the African Convention on the Conservation of Nature and Natural Resources (15 September 1968) was adopted.

## 3.2 Multilateral Environmental Agreements

In 1972, it was held in Stockholm, Sweden the first major meeting of Heads of State to discuss issues related to environmental degradation, at the UN Conference on the Human Environment.[170] The discussions mentioned mostly biodiversity conservation, chemical pollution, atomic bomb testing and whaling.[171] The Conference resulted in the Declaration of the UN Conference on the Human Environment[172], which initiated a high-level discussion, culminating on the development of principles of international environmental law.

The most significant provision extracted from the Declaration is the Principle 21, where it is established that "States have, in accordance with the UN Charter and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction". The second part of the principle, recognizing the responsibility of states for activities that may affect areas outside their jurisdiction, although not contained in the UN Charter, can be considered as accepted by international law.[173]

The principle is considered customary law in environmental law and is also partially present in article 195 of the UN Convention on the Law of the Sea.[174] In addition, there was the establishment of restrictions on the exploitation by the international community of common spaces on the globe, such as Antarctica, the seabed, etc, which should be protected and used commonly. Furthermore, the Conference established vigorous advances in the environmental area, especially when

170 The United Nations Conference on the Human Environment, also known as the Stockholm Conference, was the first major United Nations Heads of State meeting to address environmental degradation issues, held from 5 to 16 June 1972 in the capital of Sweden, Stockholm.
171 UN Doc. A/ CONF.48/14/Rev.1 (1973), p. 3;
172 Ibid.
173 LEITE, I., 2011, p. 21.
174 UN Convention on the Law of the Sea, Article 195, Duty not to transfer damage or hazards or transform one type of pollution into another, In taking measures to prevent, reduce and control pollution of the marine environment, States shall act so as not to transfer, directly or indirectly, damage or hazards from one area to another or transform one type of pollution into another.

introducing the issue definitively on state's agenda, placing it as a priority in future negotiations.

Other principles are also worthy of attention, such as Principle 12, which provides for international assistance on technical and financial field to assist developing countries, as well as Principle 24, which imposes the duty of the state to cooperate. This approach, in relation to international cooperation on the environment, consists in the emergence of the 'International Law of Cooperation' (CAMPELLO, 2014), governing a new type of international relations, aimed at the common interest of humankind, as well as its survival due its concern with the preservation of natural resources.[175]

In this sense, international cooperation through MEA uses diplomacy to support states' positions and, consequently, to establish basic regulations on international level to be also applied at national level. From this perspective, international cooperation is needed to protect the environment as it allows the necessary structures and actions for the adoption and application of global policies to be developed through international treaties based on the collaborative efforts between the states. The Declaration's greatest legacy has been the establishment of a framework for future negotiations, not to mention that the Conference led developing countries to participate fully and influentially in the proceeding.

Following Stockholm Conference, regarding the concerns on human activities and the consequent interference in the environment, it was established the United Nations Environmental Programme (UNEP), an UN subsidiary body "that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the UN system, and serves as an authoritative advocate for the global environment"[176].

On December 1990, the UNGA called for a Framework Convention on Climate Change by establishing the Intergovernmental Negotiating Committee

[175] CAMPELLO, L., 2013, p. 275.
[176] United Nations Environmental Programme website, *'Who we are',* 2020.

(INC). The Framework Convention was negotiated for one year, aiming to bring the world together to curb greenhouse gas (GHG) emissions and adapt it to climate change. The text was adopted in 1992, and opened for signature at Rio Earth Summit (Rio 92), twenty years after the first Conference.

Discussions were fruitful, as the agreements produced international reports that redefined the standards of international environmental cooperation and the understanding of states regarding related topics, with the signing of documents such as the United Nations Framework Convention on Climate Change (UNFCCC), the UN Convention on Biological Diversity, the Forests Principles, the Rio Declaration, the Earth Charter and the Agenda 21, considered to be the cornerstones of the international environmental regime.[177]

At the Conference, the Amazon stood out as a territory of global relevance, including Amazonian countries in the scenario of international environmental policies, especially when the particularities of the Amazon gained worldwide prominence, changing from regional interests to become a global interest.[178] Furthermore, the reasons that led governments and international organizations intervening to support the Amazon, considered the 'lungs of the world', are far from being only local concerns, becoming a discourse of global proportions. The attention in the Amazon stems particularly from the risk of global warming, since tropical forests, more than any other, shall have the function of balancing the temperature on the planet.[179]

The UNFCCC entered into force in 1994 with near-universal membership.[180] Hereinafter, states meet annually at the Conference of the Parties (COP) to negotiate multilateral responses to climate change. In 1997, within the third COP, the world's first MEA to reduce GHG emissions – Kyoto Protocol – was adopted,[181] including forests in the framework of international climate negotiations. The Protocol entered

177 MONTANARI JUNIOR, I., 2011, p.87.
178 VALENTE, R., 2010.
179 Ibid.
180 The UNFCCC was ratified by 174 states and has 197 parties, on 10 April 2020.
181 Kyoto Protocol to the United Nations Framework Convention on Climate Change, 1998.

into force in 2005, codifying the 'common but differentiated responsibilities'[182] principle enshrined in the UNFCCC.[183]

The principle recognizes the distinction that exists between states in terms of their economic development, especially developed states that are in a position superior to that of developing states, and their consequent historical responsibility for the harmful effects they have produced to the environment. The distinction between states creates greater interdependence for the conduct of measures and processes related to the reduction and mitigation of the harmful effects caused by human action. Thus, the principle intends to show that the commitments assumed by developing countries depend, in most cases, on the assistance and cooperation of developed countries for the fulfilment of the actions and programs instituted by the treaty, mainly in relation to costs, the transfer of technologies and technical knowledge compatible with environmental sustainability.[184]

In spite of the fact that the Protocol was a milestone, it did not have the support of countries such as the USA and China, which are the largest source of GHG emissions. These countries claimed that the Protocol's architecture, with the principle of common but differentiated responsibilities, was inefficient and not very robust. In 2009, at COP 15 in Copenhagen, a change in the architecture of the protocol begins, when the USA points to the establishment of goals determined voluntarily by the parties – the nationally determined contribution (NDC). The Copenhagen discussion became the basis for what became the Paris Agreement. The principle of common but differentiated responsibilities is reflected in this Agreement. Nonetheless, the NDC approach, presented voluntarily by the parties, is at the core of the argument that the new climate regime – started in COP 15 – and can be characterized as 'bottom up', since it let each state set its own goals for limiting or slowing carbon emissions, mitigate deforestation, maintaining transparency on

182 Kyoto Protocol, Article 10.
183 UN Doc. A/AC.237/18 (Part II), Annex I to the Report of the Committee, Acknowledging that the global nature of climate change calls for the widest possible cooperation by all countries and their participation in an effective and appropriate international response, in accordance with their common but differentiated responsibilities and respective capabilities and their social and economic conditions.
184 LIMA, L., 2003, p.29.

climate issues, and identifying the adverse effects of climate change.[185] At last, the Paris Agreement was signed by 188 states and the EU, which came to replace Kyoto Protocol in 2020.

In parallel with the COPs, UNGA convened the UN Conference on Sustainable Development (Rio + 20) to address several issues. It was held in 2012 in Brazil and it sought to establish a mandate for UN member states to build a set of objectives and targets expanding the successful experience of the eight Millennium Development Goals (MDGs).[186] In 2015, UNGA adopted the 2030 Agenda for Sustainable Development, announcing 17 Sustainable Development Goals (SDGs) involving diverse themes.[187]

As it is seen, the international regulation of the environment is aimed at more than sanctioning, but rather focusing on avoiding the damage and, if it has already been verified, mitigating its consequences. Moreover, the environmental normative was guided by consensus on the need for its preservation. In such manner, international environmental law serves as a consistent guide to prevention, based on the need to meet the objectives of developing human activities and exploiting resources with respect to the environment.

Through the years, the MEAs established the general principles expressing the behaviour indicated by the international community and can be considered as lines of conduct for the pursuit of the common environmental policy of the states. An important outcome from the MEAs was the establishment of organs like the COP to facilitate the development of negotiations on a regular basis.[188]

185 SOUZA, M., CORAZZA, R., 2017.
186 UN Doc. A/CONF.216/L.1 (2012).
187 UN Doc. A/RES/70/1 (2015).
188 UNFCCC, Article 7.

## 3.3 Remote Sensing in support of Environmental Protection

Remote sensing through EO satellites is recognized as a tool to better understand the phenomenon of climate change, in addition to making disaster response more effective and allowing better management of environmental issues, as it is capable of obtaining data, monitoring harms to the environment in regular time or even in real time, as well as its evolution, such as fires or storms.

Resolution 41/65 specifies in Principle I the purpose of remote sensing activities on the protection of the environment, and in Principle X, states that "Remote sensing shall promote the protection of the Earth's natural environment. To this end, states participating in remote sensing activities that have identified information in their possession that is capable of averting any phenomenon harmful to the Earth's natural environment shall disclose such information to states concerned".

Considering the technical aspects of satellite remote sensing, which allows the evaluation of large areas on a large scale and also inaccessible locations, providing accurate information, it displays a potential technique for the development of public policy, as well as for monitoring compliance with MEA, and also feasible solution for law enforcement when there is some harm to the environment.

In regard to the legal aspects, as analysed in the last chapter, satellite remote sensing activities does not need prior consent of the sensed state, which means the technology can be used as a tool to monitor the entire planet not worrying with borders, 'without violating the sovereignty of states'[189].

[189] According to UN Resolution 41/65.

### *3.3.1 Satellite Remote Sensing to monitor compliance to Multilateral Environmental Agreements*

In order to comply with the obligations under the MEA, there are a number of possibilities in the use of data obtained by satellite remote sensing. It is not so common to MEA to have mechanisms or bodies (e.g. COP for the UNFCCC) to ensure its monitoring, however, the elements to verify compliance are usually implicitly in some of its provisions.

In 1993, the Resolution 61 (34) on Visibility Limits of Oil Discharges of Annex I of International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78, refers to "remote sensing equipment to monitor traces of oil".[190] This MEA is one of the only which explicitly refers to remote sensing in its text.[191]

In the context of the Kyoto Protocol, article 10 (a) states that the parties "shall formulate (…) national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases (…)", requiring a monitoring system to this objective. In this regard, satellite remote sensing is useful to establish a national inventory, providing multiple and precise information.

In the paper "A review of remote sensing technology in support of the Kyoto Protocol"[192] from 2003, the authors suggest five areas this instrument may assist states to meet their obligations: (1) provision of systematic observations of relevant land cover (Articles 5, 10); (2) support for the establishment of a 1990 carbon stock baseline (Article 3); (3) detection and spatial quantification of change in land cover (Articles 3, 12); (4) quantification of above-ground vegetation biomass stocks and associated changes therein (Articles 3, 12); (5) mapping and monitoring of sources of anthropogenic CH4 (Articles 3, 5, 10).

In regard to the Paris Agreement, that came to replace the Kyoto Protocol, its Article 15 states the establishment of a "mechanism to facilitate implementation and

190 Marine Environment Protection Committee 34/23, Report of the MEPC on its 34th session, Resolution MEPC 61(34) on Visibility Limits of Oil Discharges of Annex I of MARPOL 73/78.
191 PETER, N., 2004, pp. 189–195.
192 ROSENQVIST, Å. et al., 2003, pp. 441–455.

promote compliance with the provisions". In this perspective, in order to provide precise information to meet its NDC, states may use satellite remote sensing data.

The use of satellite data may follow some steps to monitor compliance with MEA, such as primarily collecting it, then analysing the information acquired and finally verifying if the state is in comply or not with the obligations of the MEA to which it is a party. However, it may arise legal concerns on the validity of satellite data acquired in order to verify MEA.[193]

The legal aspect for the use of this technique to collect data over a foreign territory to comply with the MEA relies on the inclination by the sensing state to make available the data acquired, at the discretion of the respective state to determine whether or not to use the data to further comply with the MEA, due to its sovereignty to decide. Nonetheless, it is not agreed by any MEA that the data shall obligate any state to comply with it, culminating that satellite remote sensing is a tool to support MEA, not to police it.

Taking into account that there is no need to modify current MEA, the use of remote sensing can make them more effective because it is a significant source of information, consolidating the agreements already adopted.[194] International law, as the codification of international policy, should consider technologies when elaborating new rules, precisely on the environmental field, bringing together space tools to 'terrestrial law', where satellite remote sensing can play a role.

193 PURDY, R., LEUNG, D., 2013.
194 ITO, A., 2011, p. 147.

#### *3.3.1.1 Monitoring the Program: Reducing Emissions from Deforestation and forest Degradation, plus the sustainable management of forests, and the conservation and enhancement of forest carbon stocks*

Negotiations at the UNFCCC began to discuss the importance of forests to mitigate climate change, with their first mention in the Kyoto Protocol. However, the approach was limited, as it did not include targets for reducing carbon emissions from forests. In 2005, COP 11 was held in Montreal, where the adoption of a system of incentives was discussed, more specifically, for Reducing Emissions from Deforestation (RED).[195] The UNFCCC Subsidiary Body for Technical and Scientific Advice started to consider emissions from forest degradation in the control of carbon emissions. But it was only at COP 15, in 2009, that this vision was consolidated, by establishing guidelines for Reducing Emissions from Deforestation and forest Degradation, plus the sustainable management of forests, and the conservation and enhancement of forest carbon stocks (REDD+), and it was included in the Copenhagen Agreement.

The following year, in Cancun, COP 16 decided that the incentive mechanism should be implemented under decision 1/CP.16.[196] At para. 71 (c) of the decision, it was requested, among other things, that the beneficiary parties should develop a "robust and transparent national system for monitoring and reporting *REDD+* activities (…) if appropriate, subnational monitoring and reporting as an interim measure (…)".[197] In 2013, COP 19 held in Warsaw progressed on the issues related to the Measuring, Reporting and Verifying (MRV), which are crucial to the adequate measurement of the impacts of the mechanism.[198]

In practical terms, REDD+ comes fully into effect in 2020 under the UNFCCC as part of the Paris Agreement, as it was agreed at COP 21 held in Paris in

195 UN Doc. FCCC/CP/2005/5 (2005).
196 UN Doc. FCCC/CP/2010/7/Add.1 (2010).
197 REDD+ activities: (a) Reducing emissions from deforestation; (b) Reducing emissions from forest degradation; (c) Conservation of forest carbon stocks; (d) Sustainable management of forests; (e) Enhancement of forest carbon stocks.
198 Warsaw Framework for REDD-plus, UNFCCC.

December 2015.[199] In the agreement, REDD+ is explicitly quoted in article 5, which encouraged signatory parties to support the existing framework already agreed.

The REDD+ system is based on remote sensing, using information collected by satellites to monitor forest cover over time, identifying where deforestation has been occurring, analysing the dynamics of land use, among others. Consequently, a requirement for the implementation of the program is to have a robust national forest monitoring system that allows monitoring and reporting on REDD+ activities, allowing the country to prepare its historical series for REDD+ activities and periodically generate data for results to be measured, based on forest emission reference levels prepared based on historical series.

In regard to the robust monitoring system, the UNFCCC establishes that developed countries shall offer additional financial and technological support to developing countries in order to facilitate their mitigation and adaptation to climate change, recognizing the need for capacity building.[200]

Since carrying out activities to measure results individually can imply high transaction costs with complex *in loco* monitoring and verification processes, there is a risk of directing resources that should be allocated in REDD+ actions for the payment of specialists.[201] So, since there is not a pre-defined methodology, the use of existing satellite remote sensing technologies is useful to reduce transaction costs related to the MRV and probably with a lower total cost than if they were made at the project level for the same area.[202]

### *3.3.2 Satellite Remote Sensing for Law Enforcement*

As seen in the previous section, the role of satellite data to comply with MEA is applicable in order to address possible non-compliance with obligations. Another

199 UN Doc. FCCC/CP/2015/10 (2015).
200 UN Doc. FCCC/CP/2013/10/Add.1, Decision 14/CP.19.
201 SKUTSCH, M. et al., 2011.
202 TOKOLA, T., 2015, pp. 252-260.

particular aspect concerns the use of space derived EO data as evidence in international and national courts.

The nature of satellite imagery as evidence comprises three evidential qualities, according to the study of the London Institute of Space Policy and Law for ESA: (1) it is based on digital data; (2) the data will have to be converted into a comprehensible document by some process – processed information that will be offered as evidence, not the original data; and (3) the document will be an electronic record.[203] Due to its strictly electronic nature, different rules can be applied for admissibility by a court. According to ITO (2011), the technical nature of digital images easily exposes satellite data to intentional and unintentional errors, since it is required human operations to process recognizable satellite imagery, which may involve a certain subjectivity.[204]

Therefore, for greater acceptance, it is necessary to ensure that data goes through accurate and reliable methods to check its validity.[205] MARPOL explicit refers to remote sensing to monitor oil traces and in its article 4 states that if "sufficient evidence is available to enable proceedings to be brought in respect of the alleged violation, it shall cause such proceedings to be taken as soon as possible", accepting it as a method for litigation, but requiring its authentication.

Satellite imagery was first addressed as evidence in the case *Mali v. Burkina Faso* (1986), where the ICJ decided on the parties' consent to its use.[206] In 1996, *Song San* case on oil spill was the first that accepted remote sensing data as evidence in court.[207] In *Qatar v. Bahrain* (2001), the frontier dispute concerning a natural channel that was blocked by a construction of a refinery, utilized SPOT and Landsat data to measure the accuracy of the bathymetric charts.[208] On national level, the US has a large number of cases in which satellite data has been sent to the Court as evidence.[209]

203 Document ESA-ISPL/EO 76/final, Evidence from Space, Final Report.
204 ITO, A., 2011, p. 144.
205 Document ESA-ISPL/EO 76/final, Evidence from Space, Final Report.
206 *Mali v. Burkina Faso*, 1986 ICJ 554, ICJ Report.
207 PURDY, R., LEUNG, D., 2013, p. 109.
208 ITO, A., 2011, p. 136.
209 PURDY, R., LEUNG, D., 2013, p. 110.

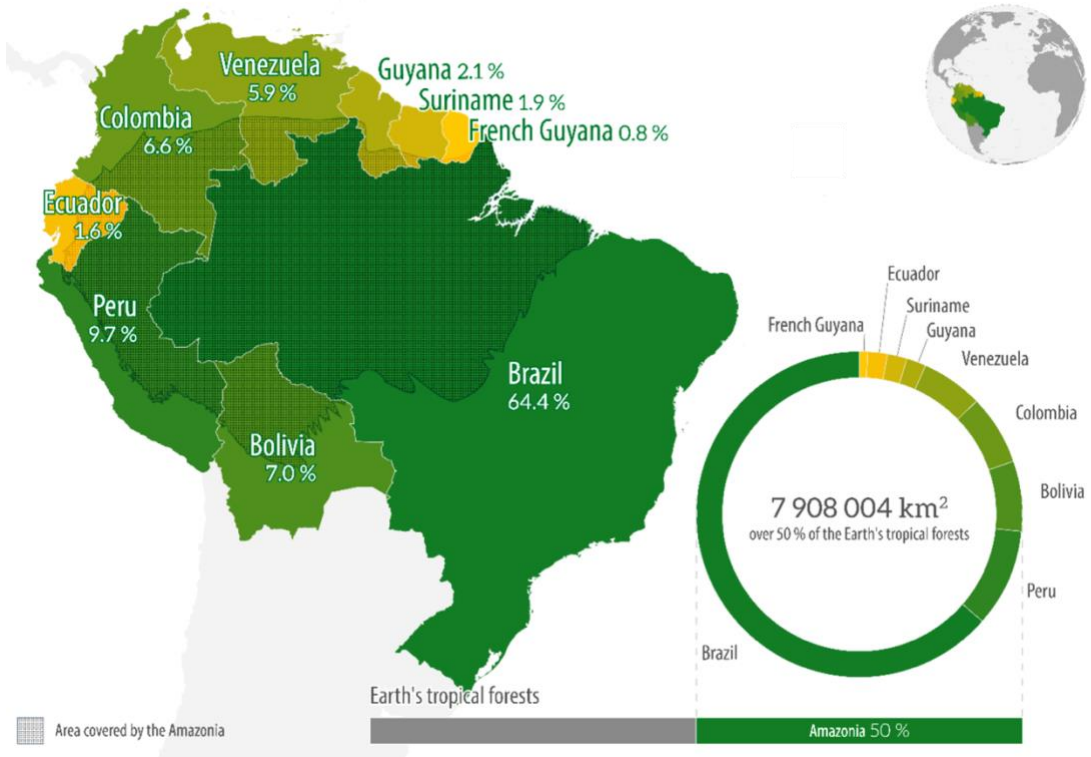
In relation to forests, the use of satellite images can play an important role as a historical record of changes in the observed areas, providing valuable evidence. However, when in litigation, the rules for due process of law must be taken into account, so that the admissibility of EO dates as evidence will depend on the applicable law. Despite the cases cited, satellite data is not yet widely accepted as evidence. Other issues may arise when using satellite data for law enforcement, such as its balance with privacy and the right to data. Perhaps, the validity of EO data can guarantee greater reliability, requiring harmonized international rules for this purpose.

# Chapter 4. The Interplay between Space Cooperation and the Environmental Legal Frameworks for Amazon: the ACTO and the Leticia Pact

## 4.1 The Amazon Region

The Amazon is the world's largest rainforest encompassing an area of almost 8 million square km,[210] comprising a diverse variety of species of fauna and flora, as well as a culturally diverse region, with 34 million inhabitants, 420 distinct indigenous peoples, 86 languages, and 650 dialects,[211] embracing eight countries plus an overseas department and region of France: Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, Venezuela, and French Guiana (Figure 2).

**Figure 2. The Amazon Region**




Source: EPRS, with data from Instituto SINCHI, https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/644198/EPRS_BRI(2019)644198_EN.pdf

210 The Amazon biome encompasses an area of approximately 7.9 million square km; the Amazon rainforest is inside it, with an area of approximately 5,5 million square km.
211 GARCIA, B., 2011, p. 25.

The Amazon has a fundamental role in the climatic balance of the region and also of the entire planet due to its large reservoir of carbon, by absorbing more $CO_2$ than it emits, around six hundred million metric tons of $CO_2$ each year, functioning as an enormous climatic regulator, contributing not only to the entire water cycle regime in South America, but also in the moderation of phenomena such as El Niño and La Niña.[212] The rainforest assists in the maintenance of the water cycle by adding water to the atmosphere through the transpiration process of the trees, contributing to the formation of rain clouds, which release the water back into the forest, remaining around 50 to 80 percent of humidity in the ecosystem water cycle.[213]

With deforestation, there is the reduction on the amount of water in the atmosphere, affecting regional precipitation patterns which can cause droughts beyond the Amazon. At present, the rainforest is close to a tipping point,[214] according to scientists who believe that deforestation has caused the Amazon to absorb less than half as much $CO_2$ as it did twenty years ago.[215]

Sixty percent of the rainforest is under Brazilian jurisdiction.[216] According to the Brazilian National Institute for Space Research (INPE), the process of deforestation in the Brazilian Amazon grew 108% in January 2020, compared to the previous year, totalizing 9,166 square kilometres of forest lost in 2019, while in the previous year were 4,946 square kilometres.[217]

The biodiversity of the region forms a complex economic potential that is difficult to manage and protect due to its continental distances, making the prediction of deforestation a difficult task considering the lack of coordinated infrastructure and

212 Amazon Aid Foundation website, 2019.
213 The Amazon is also important to regional precipitation patterns. It releases up to twenty billion tons of water each day. Plants pull water out of the ground and release it as vapor in a process called transpiration. The vapor rises and forms rainclouds; Mongabay, 2019.
214 HANBURY, S., 2019.
215 Ibid.
216 Brazilian Amazon represents about 60% of the Amazon Rainforest; Peru, with approximately 13% followed by Colombia, with about 10% and Bolivia, Ecuador, Venezuela, Guyana, French Guiana and Suriname, which together hold about 17% of the Amazon rainforest.
217 DW, 2020.

capacity building in the region. However, environmental change can be analysed from historical data provided by satellite images over a long period of time, to examine the areas most affected by deforestation. In addition, real-time detection of deforestation through satellite images may be among the solutions to prevent and mitigate these environmental hazards. [218]

Conserving the Amazon is a service that is provided to the rest of the world, by keeping the rainforest intact in order to keep all of that carbon underground.[219] Nonetheless, cooperation is fundamental when addressing a global issue under nine countries' jurisdiction.

## 4.2 Regional Cooperation

Regional cooperation is a subset of international cooperation. The UN Charter framed international cooperation within the concept of international law, considering the principle of cooperation as the basis for UN multilateralism. In 1970, the Resolution 2625 (XXV) on "Declaration on Principles of International Law concerning Friendly Relations and Co-operation among States" was adopted by UNGA,[220] which explained the characteristics of a legal system of an international community. One of the seven principles enshrined in the Declaration is the duty of international cooperation expressing that "states have the duty to co-operate with one another, irrespective of the differences in their political, economic and social systems, in the various spheres of international relations, in order to maintain international peace and security and to promote international economic stability and progress, the general welfare of nations and international co-operation free from discrimination based on such differences"[221].

In the American continent, international cooperation is codified in the framework of the Organization of American States (OAS), which in the preamble to

[218] FROEHLICH, A., TĂIATU, C., 2020, p. 108.
[219] EVANS, T., 2019.
[220] UN Doc. Resolution 2625 (XXV), 1970.
[221] Ibid, The duty of States to co-operate with one another in accordance with the Charter.

its Charter states that its members are "convinced that the well-being of all of them, as well as their contribution to progress and the civilization of the world will increasingly demand intense continental cooperation"[222]. Furthermore, it provides that states shall strive to "promote, through cooperative action, their economic, social and cultural development"[223]. In this sense, the Charter imposes a commitment to broad cooperation, regardless of the political system adopted by the American states,[224] as well as economic cooperation is considered "essential to the common welfare and prosperity"[225]. These provisions suggest some duty of international cooperation, which is corroborated by Chapter VII of the Charter, dedicated to integral development, which expressly affirms the "principles of interAmerican solidarity and cooperation", necessary for the complete development.[226]

Cooperation is affirmed as a "common and joint responsibility of the Member States" and "it should include the economic, social, educational, cultural, scientific, and technological fields".[227] In addition, the Charter honours the existence of multilateral development cooperation bodies, declaring that it must have the characteristic of continuity and emphasizes that the state contribution to cooperation is due according to its resources and its internal legislation. Cooperation is not an end in itself, but a means to achieve certain objectives, which should be highlighted not only to understand the importance that should be given to cooperation, but also for the effect that such factors have on cooperating countries.

Specifically, in Latin America, regional cooperation begins with the discussions to establish the Latin American Free Trade Association (LAFTA), seeking to reach a free trade area. Years later, other forms of cooperation, purposely to economic integration, were gaining strength, with a view to reversing the developed countries' dependency, seeking to identify common problems and face international challenges

222 OAS, Charter of the Organisation of American States, 30 April 1948.
223 Ibid, Art. 2, (f).
224 Ibid, Art. 3 (e).
225 Ibid, Art. 3 (k).
226 Ibid, Art. 30.
227 Ibid, Art. 31.

by cooperating with one another. The Latin American region has a large number of economic blocs for integration and development, mainly UNASUR, MERCOSUR, Andean Community, OAS, ALADI, ALBA, CARICOM.[228] A study led by the Institute for Applied Economic Research (IPEA) in Brazil concluded that the integration of production chains in South America is still very incipient, despite its potential for development.[229]

The cooperation model of the listed blocs seeks integration, through the development of common policies. Unlike this model, Amazonian countries, specifically to 'promote the harmonious development of their respective Amazonian territories in such a way that these joint actions produce equitable and mutually beneficial results and achieve also the preservation of the environment, and the conservation and rational utilization of the natural resources of those territories' signed the Amazon Cooperation Treaty (ACT), establishing a cooperation model for the region that does not aim at integration.

### *4.2.1 Amazon Cooperation Treaty Organization*

The concerns expressed on the environment at the Stockholm Conference favoured Amazonian dialogue in the 1970s. The ACT was signed in 3 July 1978 comprising eight countries and it is not open for accession (art. XXVII). French Guiana is one exception to the cooperation. The French overseas territory has been excluded from the Amazon cooperation process for geopolitical reasons, due the fact that it is still subordinate to France, and its participation as a contracting party would imply a certain degree of influence from the EU over the Amazon countries and under issues that concern that region.[230]

228 Southern Common Market (MERCOSUR), Union of South American Nations (UNASUR/USAN), Andean Community, Organization of American States (OAS), Latin American Integration Association (ALADI/LAIA), Bolivarian Alliance for the Peoples of Our America (ALBA), Caribbean Community (CARICOM).
229 IPEA website, *Cadeias produtivas têm potencial na América do Sul*, 2016.
230 COSTA, B., 2016.

In this regard, the notion of Pan-Amazon has been replaced by that of 'Pactual Amazon'[231], since French Guiana also has Amazonian territory.[232] The scope of the ACT depends on an autonomous legal determination, encompassing the 'Pactual Amazon', which is determined by the sum of the 'Legal Amazon' area of each contracting party, despite not all states having enacted internal rules defining its part of the territory that corresponds to its national Amazon.[233] (Figure 3)

**Figure 3. ACTO Contracting Parties**


231 FRANCO, G., 1996.

232 Base Jurídica del Tratado de Cooperación Amazónica, Organización del Tratado de Cooperación Amazónica, Secretaría Permanente (OTCA/SP), 2013.

233 In Bolivia, the Amazon area is stated in its 2009 Constitution, on Art. 390, para. II. In 1953, Brazil enacted the Law no. 1.806, establishing the Legal Amazon comprising nine states (Acre, Amazonas, Amapá, Maranhão, Mato Grosso, Pará, Rondônia, Roraima, and Tocantins), subsequently revoked by Law no. 5.173 from 1966 that maintained the Legal Amazon status, presenting a new plan for the economic valuation of the Amazon. In Colombia, it consists of six departments, according to Art. 1 of Decree no. 3.083/1986. In Ecuador, it is determined by legislative Decree no. 41, from 5 August 1980. In Peru, Law no. 27.037/1998 provides a detailed description of the national Amazon. In Venezuela, the portion of the territory covered by the TCA corresponds to the State of Amazonas. Guyana and Suriname do not have specific internal rules.

The ACT is an example of a generic and regional treaty addressing a range of issues that depend on specific regulations, providing that "in view of the need for the use of flora and fauna in the Amazon to be rationally planned, in order to maintain the ecological balance of the region and preserve species, the contracting parties shall adopt a clear line of measures, how to promote scientific research and the exchange of information and technical personnel between the competent entities of the respective countries. To achieve the objectives of the Treaty, the Contracting Parties have signed bilateral treaties that, over time, will cover all aspects of environmental protection"[234]. The ACT also seeks to "maintain a permanent exchange of information and cooperation among themselves and with the agencies for Latin American cooperation".[235]

The ACT is analysed in five periods of time: the first one with the defensive-protectionist phase (1978-1989); the second with boost and political strengthening (1989-1994); third is the institutional maturity (1995-2002), the fourth is when the organization had institutional visibility (2002-2009), and finally, the fifth period which consists of revitalizing the organization (2009-present).[236]

The Amazon Cooperation Treaty Organization (ACTO) was established precisely from the Amendment Protocol to the ACT, signed in 14 December 1998. Within the Protocol Amendment, countries agreed to create the organization, which has legal personality and is competent to agree with the contracting parties, with non-member states and with other international organizations, as well as set up a permanent secretariat, established in 2002, with headquarters in Brasilia.

ACTO has special characteristics, mainly because it is an organization for cooperation, not for integration.[237] It is for cooperation between the Amazonian countries in the search for solutions that, by helping each other, since states faces

234 ACT, Arts. VI and VII.
235 ACT, Art. XV
236 TIGRE, M., 2017.
237 The draft prepared by the Brazilian chancellery had the word "integration". However, due to Venezuela's claim, it was replaced by "cooperation", with the exception of a brief reference in the preamble.

common problems, in a basin as strategic and extensive as the Amazon. The organization focuses on seeking solutions among states for the conservation of natural resources in the region, the sustainable use of these natural resources, the protection of their communities, especially indigenous communities. The fundamental principle of this organization was the protection of the sovereignty of the Amazonian countries over their Amazonian territories and over these natural resources that are strategic for their development, since one of the signatories' purposes was to expressly refute any speeches regarding a possible internationalization of the Amazon. The Organization works mainly through the chancelleries, which in each country have an ACTO follow-up structure, called permanent national commissions.[238]

In 2009, the chancellors of the Amazonian countries met and approved a strategic agenda for Amazonian cooperation that contains the fundamental themes of the organization.[239] Hence, the most important regional project carried out was the forest cover monitoring, where states were able to establish technical networks for exchange and information.[240] The experience was based on the methodologies and technologies developed by INPE, which resulted in the transfer of knowledge by providing technical capacity to replicate INPE's methodology in the contracting parties, in order for them to develop their own system for monitoring deforestation (see section XXX).[241]

In 2012, the project enabled contracting parties to install National Observation Rooms, with the support of the national coordination designated by the countries.[242] For the effectiveness of these observation rooms, it was necessary to train teams in monitoring techniques. In this context, INPE signed agreements to promote the

238 In February 2020, the President of Brazil removed the National Council of Amazonia from the Ministry of the Environment, where it had been since 1995, transferring it to the Vice Presidency of the Republic.
239 Base Jurídica del Tratado de Cooperación Amazónica, OCTA, Secretaría Permanente, 2013.
240 Ibid.
241 ACTO website, *Projects*.
242 The project was also partially funded by the Brazilian Amazon Fund and also received financial assistance from Germany (BMZ/GIZ), the Netherlands (DGIS), and ITTO.

training of technicians responsible for the observation rooms, in monitoring technologies.[243] (Table 1)

**Table 1. Major institutes that monitors its national part of the Amazon**

| Country | Institutes |
|---|---|
| **Bolivia** | **Direction of the Ministry of Environment and Water** through the ACTO observation room |
| **Brazil** | **INPE:** National Institute for Space Research / **INPE/CRA**: National Institute for Space Research - Amazon Regional Center |
| **Colombia** | **SINCHI:** Amazonic Institute of Scientific Research / **SIAT-AC:** Territorial Environmental Information System of the Colombian Amazon / **SIAC:** Colombian Environmental Information System |
| **Ecuador** | **MAE:** Ministry of the Environment |
| **Guyana** | **GFC:** Guyana Forestry Commission |
| **Peru** | **LTA:** Laboratory of Applied Remote Sensing and Geographic Information Systems of the Academic Department of Forest Management at National Agrarian University (UNALM)<br>**SERFOR:** National Forest and Wild Fauna Service |
| **Suriname** | **SBB:** Foundation for Forest Management and Production Control |
| **Venezuela** | **Ministry of Environment and Natural Resources:** Directorate-General for Forests |

Through these institutes for exchanging information, there was a subsequent support to national institutions for the government to carry on the initiatives related to monitoring deforestation and changes in land use, the formulation of national plans for monitoring forest cover in ACTO contracting parties.[244] Regrettably, the organization has not established a long-term policy to continue the project for sharing information.

During more than forty years since the signing of the Treaty and twenty years since the establishment of the organization, a work agenda was structured with

[243] The Tropical Forest Monitoring courses were carried out using the Terra Amazon/PRODES system, which has the capacity to provide updated information on deforestation. ACTO's agreement with INPE/CRA also includes satellite burn monitoring; as well as obtaining information through the mapping of land use and coverage of areas already deforested.

[244] ACTO member countries have formulated their respective national monitoring plans or updated existing plans. These plans validated at national workshops were presented at the Regional Workshop in Lima, Peru, in August 2014. It has been published four regional maps covering deforestation in the 2000–2010, 2010–2013, 2013–2014 and 2014–2015 period.

themes such as biological diversity and indigenous communities, sustainable management of water resources, monitoring, conservation and protection of forest resources. However, political observers agree that the ACTO is far from having effective projects, due to the little importance given by the contracting states to the organization, being more concerned with defending their sovereignty over the region than promoting conservation or even the sustainable development of the Amazon region.[245]

In 2020, with the aim to regain international leading in this matter, Brazil seeks to strengthen the Permanent National Commission under the ACTO, as well as to settle existing debts with the organization.[246]

### *4.2.2 Leticia Pact*

On 6 September 2019, representatives from Bolivia, Brazil, Ecuador, Colombia, Guyana, Peru and Suriname met in Leticia, Colombia, to sign the MEA so-called Leticia Pact to promote concrete actions aimed at ensuring the protection of the Amazon rainforest, including the mitigation of deforestation, forest restoration initiatives, the sustainable use of resources, actions to strengthen women and indigenous people, and the creation of educational campaigns to highlight the importance of the Amazon region (Figure 4).[247]

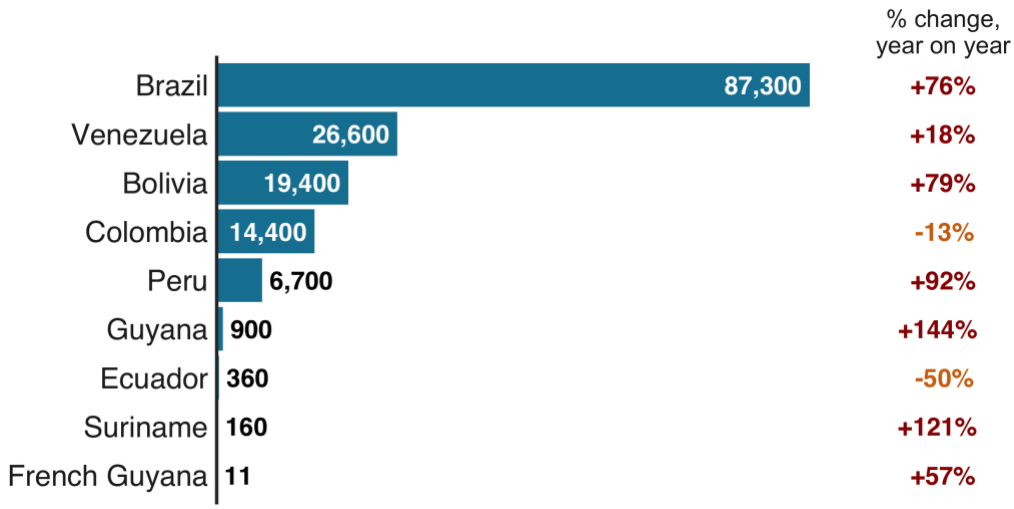
245 Peru Support Group, *The Leticia Pact: A Fresh Start or Just More Empty Rhetoric?*, 2019.
246 Folha de Pernambuco, *Brasil quer reativar organização para recuperar protagonismo internacional na Amazônia*, 2020.
247 Leticia Pact for the Amazon Region, 6 September 2019.

**Figure 4. Leticia Signatories**


A number of factors led to the signing of the Pact. In 2019, according to INPE, just between 1 January and 29 August 2019, 87.300 forest fires occurred in Brazil, representing an increase of 76% in relation to the same period in 2018 (Figure 5). Only in August, 42.719 forest fires were detected, an increase of 128% with reference to August of 2018. The situation in Bolivia was similar, with the fire consuming about 2.1 million hectares of forest.[248] This smoke from the fires transformed the day into night in São Paulo, the largest city in Brazil, located more than 2.000 kilometres from the Amazon region (similar to the distance from Lisbon to Oslo).[249]

248 Reuters, *As Bolivian forests burn, Evo's bet on Big Farming comes under fire*, 2019.
249 BBC, *Brazil fires prompt 'prayers' for Amazon rainforest*, 2019.

**Figure 5. Total number of fires between 1 January – 29 August 2019**




Source: BBC, INPE, https://www.bbc.com/news/world-latin-america-49433767

The deforestation issue due to the fires has crossed the borders of Latin America and gained global repercussion, with pressure from world leaders, mainly to Brazil, to resolve the issue.[250] The President of France summoned G7 members to discuss the topic at the summit in August, who agreed to provide USD20 million in emergency aid to fight fires,[251] approximately half of what costs to organize the G7 summit.[252] The President of Brazil rejected the aid, implying that, by accepting it, he would put the country's sovereignty into question. The government repeatedly rejected international efforts to protect the region.[253]

In parallel, since Brazil was not leading the discussions on regional level, the Venezuelan government has called an emergency meeting through ACTO.[254] In opposition, the President of Colombia stated that the organization did not have sufficient leadership at the presidential level to guarantee the protection of the region, calling for a special meeting of the Amazonian countries – together with the President of Peru – to be held in the city of Leticia, Colombia, excluding France (French

250 G1, *Líderes mundiais pressionam Brasil e pedem solução para incêndios na Amazônia*, 2019.
251 DW, *G7 libera 20 milhões de dólares para a Amazônia*, 2019.
252 Business Standard, *The French Parliament has voted to allocate 36.4 million euros for the organization of the G7 summit*, 2019.
253 JovenPan, *Planalto diz que recusará ajuda de US$ 20 milhões oferecidos pelo G7*, 2019.
254 El Diario website, *Venezuela propone una reunión urgente de la OTCA por los incendios en la Amazonía*, 2019.

Guiana) and Venezuela. Although Venezuela participates in the ACTO, it was not invited due the non-recognition of its government by almost all countries that participated in the summit, including Brazil and Peru.

The meeting on 6 September 2019 brought 16 points to address the matter, highlighting the need for regional coordination for disaster response (increasing efforts to monitor deforestation activity via satellite, exchanging monitoring data and creating an Amazon Network for Natural Disaster Cooperation), green innovation (by expanding afforestation initiatives) and the participation of indigenous people and the empowerment of woman to encourage their active participation in the conservation and the sustainable development of region.

In the preamble of the Pact, a point that draws attention is the denial of practices of deforestation, ignoring that the loss of forests is related to the exploitation of resources in its territories:

> "(…) expressing their concern about the deforestation and forest degradation that is occurring by different causes in each of the countries, bearing in mind their respective regulatory frameworks, including those causes of deforestation that, according to necessary evidence, could be linked to climate change and its structural causes (…)".

However, in the second point of the Pact, this issue is treated differently, with a view 'to combat illegal activities threatening the conservation of the Amazon region'.

It was also declared the commitment to formulate an action plan to develop the points agreed holding follow-up meetings to evaluate its progress, and the intention to cooperate with the ACTO and other organizations, with full respect to their sovereignty.

On 11 December 2019, during COP 25 in Madrid, Spain, the signatory countries (with the exception of Bolivia) presented and adopted the Action Plan of the Leticia Pact for the Amazon, providing 52 key actions grouped into five thematic axes: (i) reforestation, conservation, sustainable use of forests and biodiversity and promotion of the bioeconomy; (ii) amazon security; (iii) information and knowledge management and reports; (iv) empowerment of women and indigenous peoples; and (v) financing and international cooperation.

On 11 August 2020, Colombia and Peru convened the II Presidential Summit for the Amazon – which was virtual due the COVID-19 public health emergency – to review the progress in the implementation of the Pact of Leticia and endorse the region's political commitment of protecting this ecosystem and the measures that countries will implement to advance the conservation and sustainable development of the Amazon. The biggest achievements were the creation of a financing and support mechanism for the action plan implemented by the Inter-American Development Bank (IDB), and the agreement of a Protocol for Forest Fires Management in the Amazon, which will be developed during the second semester.[255]

The document proposes greater efficiency than the ACT, with a view to joining efforts to benefit the conservation and sustainable use of the Amazon region. However, due to the lack of actions coordinated by governments for the implementation of ACTO and the lack of clear goals agreed in Leticia, there are doubts as to whether the Pact represents a real interest in cooperation.

The region is very relevant to climate change, that is why it should promote a joint and unified policy for the Amazon. The Leticia Pact loses strength on this point, by excluding Venezuela and French Guiana. A strategic vision for mitigating deforestation and promoting a sustainable economy must be thought of with the strengths of each country, so that the whole benefits. Advantages could be taken from the technology and knowledge transfer experience through the project developed under the ACTO.

Like most MEA, the Leticia Pact can also be classified as generic, requiring further details of its content through Action Plans and Protocols, in order to provide pillars for progressive action and regulatory priorities. The Pact emphasizes the need for regional cooperation but does not provide concrete standards of conduct. The development of normative instruments in addition to the Pact is absolutely indispensable.

[255] Declaration of the II Presidential Summit of the Leticia Pact for the Amazon, 11 August 2020.

## 4.3 Space Cooperation for Amazon Protection and Development

The focus on satellite monitoring cooperation and data sharing in the Amazon region introduced by the Leticia Pact is quite significant. On one hand, it represents a rearrangement from isolated monitoring toward cooperative monitoring in order to provide the scientific evidence required for adequate decision making encompassing the region. However, in 2010, a similar project was carried out through ACTO and INPE, allowing the contracting states to have the conditions to implement monitoring systems through the transfer of technology offered by INPE.[256] In order to make feasible coordinated actions in the Amazon, satellite remote sensing is key and can also contribute to enhance space cooperation.

### *4.3.1 Elements of Space Cooperation*

A definition of space cooperation is described with essential elements to consider, according to the Russian experts[257]:

> "International cooperation in the exploration and use of outer space may be described as joint scientific, technical, economic, political and legal activities of states to ensure the use of achievements of space science and technology for peaceful purposes and for the benefit of all countries and peoples."

Therefore, regional cooperation in the space sector is set up by those elements in the Amazonian countries. Since space cooperation in the region encompass Latin America, a broader cooperation is analysed.

#### *4.3.1.1 Scientific and Technical Cooperation*

The Space Conference of the Americas (CEA) has greatly influenced scientific and technical discussions on space activities in Latin America. With a view to bring the countries of the region to advance the development of space activities and promote

256 TIGRE, M., 2016, p. 413.
257 VERESHCHETIN, K., VASILEVSKAYA, E., KAMENECKAJA, E., *in* MONROY, C., 2010, p. 15.

the peaceful of the technologies and applications derived from them, CEA was created in 1990. Throughout its discussion forums,[258] a series of possibilities for regional cooperation in space were debated, by identifying regional strategies and actions to promote space applications such as in environmental protection, which contribute to the economic growth and social development of the countries.

Another instrument was created in South America by the Space Generation Advisory Council in Support of the UN Programme on Space Applications: the South American Space Generation Workshop (SA-SGW). The workshop focuses on providing opportunities to share regional perspectives on space activities, bringing together students and young professionals by organizing workshops in different countries. The outcomes of CEA and SA-SGW consistently call for strengthening regional cooperation relating to space activities, building capacity and facilitating the exchange of information and expertise among states for its own benefits.[259] Despite the regional dialogue, as well as the establishment of space agencies and space commissions in several countries in the region, there is still a lack of a regional space policy and even a specific project involving several countries.

In regard to regional cooperation in remote sensing, the first effort was taken in 1977, during the UN Food and Agriculture Organization Regional Training Seminar on the Applications of Satellite Remote Sensing, in La Paz, Bolivia.[260] In 1980, in San Jose, Costa Rica, the XIV International Symposium on Remote Sensing of Environment was decided to organise a special reunion to create the Latin American Society of Remote Sensing Specialists (SELPER).[261] The Society promotes activities related to remote sensing in aim at the professional improvement of its

258 Seven Conferences have been held: San José de Costa Rica (1990); Santiago de Chile (1993); Punta de Este, Uruguay (1996); Cartagena de las Indias, Colombia (2002); Quito, Ecuador (2006); Ciudad de Pachuca, México (2010); Managua, Nicaragua (2015).
259 ESA, Reports, Conferencia Espacial de las Américas.
260 ARAYA, M., 1984, pp. 43-48.
261 Ibid.

members to contribute positively to the benefit of the Latin American community and its institutions.[262]

### *4.3.1.2 Legal and Political Cooperation*

At large, the Amazonian countries contributed to the development of the legal structure of space law adopted by UNGA, showing their interest in the development of international space law (Table 2). As discussed in Chapter 1, some states participated more actively than others.

**Table 2. Status of international agreements relating to outer space activities by the Amazon countries**

| | UN Treaties | | | | | Other agreements | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **State** | 1967 OST | 1968 ARRA | 1972 LIAB | 1975 REG | 1979 MOON | 1963 NTB | 1971 ITSO | 1974 BRS | 1976 IMSO | 1992 ITU |
| Bolivia | S | S | | | | R | R | | R | R |
| Brazil | R | R | R | R | | R | R | S | R | R |
| Colombia | S | S | R | R | | R | R | R | R | R |
| Ecuador | R | R | R | | | R | R | | R | R |
| French Guiana (France) | R | R | R | R | S | | R | S | R | R |
| Guyana | S | R | | | | | | | | R |
| Peru | R | R | R | R | R | R | R | R | R | R |
| Suriname | | | | | | R | | | | R |
| Venezuela | R | S | R | R | R | R | R | | R | R |

(R = ratification, acceptance, approval, accession or succession; S = signature only)
OST (Outer Space Treaty); ARRA (Rescue Agreement); LIAB (Liability Convention); REG (Registration Convention); MOON (Moon Agreement); NTB (Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water); ITSO (Agreement Relating to the International Telecommunications Satellite Organization); BRS (Convention Relating to the Distribution of Programme-Carrying Signals Transmitted by Satellite); IMSO (Convention on the International Mobile Satellite Organization); ITU (International Telecommunication Constitution and Convention).

Although the broad participation in the development of the *corpus iuris spatialis* and the Bogotá Declaration, the region lacks regional and national regulations. In light of this, in 2007, during the third meeting on Science, Technology and Society, organized by the Uruguayan Society for the Advancement of Science, the demand for a virtual Regional Space Law Centre was highlighted, as well as greater investment by

[262] SELPER website, *Objetivos*.

states in education aimed at the dissemination of space law with a view to support regional cooperation projects in the space sector.[263] The statements of the meeting were based on the Vienna Declaration on Space and Human Development, which among its points aims at the development of space law, especially in developing countries.

On one hand, characteristics such as physical proximity, language and culture, as well as the common interests expressed through the Amazon Cooperation Treaty Organization (ACTO), favour wider cooperation for the Amazon region in the space sector as the reason to support and develop space cooperation in order to monitor the Amazon region. On the other hand, the lack of capacity and regulation may result in challenges to achieve a long-term cooperation in satellite remote sensing. According to MONROY, 2010:

> "experience has shown that in bureaucratic systems with no applicable regulation, any procedure can take longer than expected. For example, the absence of a national entity in charge of coordinating the distribution of satellite information can result in decision makers setting barriers to the effective use of space applications at the national and regional levels. On the contrary, a well-defined national space policy and regulations can promote the efficient use of space applications for national and regional development, providing satellite information in a continuous and timely manner".[264]

The need for space regulation in the region turns out to be a key issue for negotiating a regional cooperation involving the states' rights and obligations. Space regulation ends up promoting two sides, both in the performance of space activities in relation to legal security, and in their own promotion, encouraging cooperation.

Due to the lack of regulation, especially in satellite remote sensing, legislating on national or even on regional level it is necessary so that states are not subject to the legislation of those who have it, when negotiating bilateral agreements. The Remote Sensing Principles shall also be observed, but as it seen in Chapter 2, it is not favourable to the sensed state.

263 SANTOS, A., MONSERRAT FILHO, J., 2008, pp. 6–9.
264 MONROY, C., 2010, p. 86.

### *4.3.1.3 Economic Cooperation*

In regard to economic cooperation, the Andean Community (CAN)[265] was the first trade bloc in the region recognizing the need for a cooperation in a satellite service, to provide the development of telecommunication infrastructure in the subregion, by taking advantage of the 67° west orbital position.[266] In 1974, the bloc established the Telecommunication Association of the Andean Community (ASETA).[267] In 1977, the Condor project began, including the launch of two satellites called Simón Bolívar, under the direction of five state telecommunications companies from the member countries, which was later called the Andean Satellite Project *Simón Bolívar*. For 15 years, studies were carried out and the orbital positions were reserved, but the project did not continue.

In 1994, the Andean Committee of Telecommunications Authorities reactivated the project with a view to the participation of the private sector, designating ASETA as its Permanent Consultative body in 1997.[268] In 1998, the CAN got the right to the orbital position of 67° west and the recognition of the set of frequencies for the *Simón Bolívar* Satellite System were negotiated.[269]

In 2009, CAN Decision 725 granted the Dutch company New Skies Satellites, B.V. (SES) authorization for the exploration and commercialization of the 67° west orbital position, for a period of thirty years.[270] The terms and conditions of this decision allowed the signature of the contract between the CAN General Secretariat and SES, in 2010.

265 The Community comprised Bolivia, Chile, Colombia, Ecuador, Peru and Venezuela.[265] Chile left in 1977 and Venezuela in 2006.
266 Andean Community website, *Presentación del proyecto Satelital Simón Bolívar*, 1999.
267 ASETA website, *Quiénes somos*.
268 Ibid.
269 ITU, Workshop, *Presentation by the CAN General Secretariat on Red Satelital Andina Simón Bolívar 2*, 2017.
270 Andean Community, *Decision 725 Autorización comunitaria para la explotación y comercialización del Recurso Órbita Espectro de los Países Miembros en la posición 67° Oeste*, 2009.

In 2017, through CAN General Secretariat Resolution 1917 and the procedures established in Decision 707,[271] the Andean Satellite Registry was granted to SES-10. In the same year, the SES-10 was launched, built by Airbus Defense and Space and based on the Eurostar E3000 platform. The spacecraft has varied missions and provides services exclusively to Latin America.

In general, few Amazonian countries, including the ones from CAN, maintain bilateral agreements mainly with countries outside the region to achieve its space programme objectives.

### *4.3.2 Towards a Regional Space Agency*

In order to implement space cooperation, Chile presented a proposal at UNISPACE II to create a regional space agency: the South American Space Agency (SASA).[272] This point was discussed at the Seminar on Space Applications held in Brazil, focusing on the implementation of the recommendations of the UNISPACE II, where the importance of regional cooperation was stressed, although states are not willing to seek South American integration in the space sector through a new international organization.[273] In 2011, the creation of SASA was proposed by the Argentine Minister of Defense to its Brazilian counterpart, within the scope of UNASUR – which would provide an existing legal framework for building the agency, as it maintains the precedent for international cooperation in the region on a large scale.[274]

In parallel with this proposal, during the first CEA (1990), a bigger proposition was discussed among the scientific community encompassing the creation of a Latin American Space Agency (LASA), following ESA as a model.[275] Brazil was against it

271 Andean Community, *Decision 707 Registro Andino para la autorización de satélites con cobertura sobre territorio de los Países Miembros de la Comunidad Andina*, 2008.
272 UN Doc. A/CONF 101/10 (1982).
273 UN Doc. A/AC.105/321 (1983).
274 MercoPress, *Argentina with Brazilian support proposes a South American space agency*, 2011.
275 21st Century Science & Technology Magazine, *Interview with Astronaut Frankin Chang-Diaz, Reaping the Benefits of Latin American Space Cooperation*, 2002 in MONROY, C., 2010.

believing that a new international body would demand a lot of bureaucracy and few results.[276]

In 2013, during the preparatory meeting of space agencies and commissions in Latin America, promoted by the Colombian Space Commission, the Brazilian Space Agency proposed the creation of a Latin American Alliance of Space Agencies (ALAS) capable of meeting the needs and demands of countries in the region.[277] ALAS would serve the initial purpose of implementing two programs: cooperation between Latin American universities for the production of small satellites, with the mission of providing services to countries in the region, as well as setting up a regional system for access, distribution and use of data and satellite images necessary for each country's social and economic development plans.

In 2016, during the 67th International Astronautical Congress, in Guadalajara, Mexico, participants from Latin America brought back to the discussion and defended the creation of the LASA, with the aim of allowing states to exchange more information on natural disasters and climate change, such as reinforce actions in terms of the digital gap and security cooperation.[278]

The idea for the establishment of a regional space agency, such as a substantial cooperation with the existent agencies are still in discussion, but it seems that the political challenges and economic instability faced by the region have delayed large scale projects throughout the years. The new regional project with the intention to the share of satellite data to monitor the Amazon through the Leticia Pact could give a new impetus to this discussion.

### *4.3.3 Regional Satellite Remote Sensing Cooperation*

Satellite remote sensing is essential for environmental protection, in order to generate necessary information to implement policies aimed at sustainable development. For

276 AEB website, *AEB recua e extingue criação da Agência Espacial Latino Americana*, 2015.
277 AEB website, *Aliança Latino Americana de Agências Espaciais*, 2013.
278 Infoespacial, *Varios países sudamericanos estudian creacion agencia espacial latinoamericana*, 2016.

this purpose, to address forest monitoring in its Amazon territory, Brazil, Colombia, Peru and Venezuela developed its own satellites for remote sensing. (Table 3)

**Table 3. Space capacities in satellite remote sensing by country**

| Country | Space Agency | Satellites / Number* | Remote Sensing Satellites |
|---|---|---|---|
| **Bolivia** | ABE | Yes / 1 | - |
| **Brazil** | AEB | Yes / 27 | 1. CBERS-4 (2014)<br>2. CBERS-4A (2019)<br>*3. AMAZONIA-1 (foreseen 2020)* |
| **Colombia** | CCE | Yes / 2 | 1. FACSAT-1 (2018) |
| **Ecuador** | EXA | Yes / 3 | - |
| **French Guiana (France)**** | CNES | Yes /134 (73 launched from French Guiana) | 1. SPOT 5 (1998)<br>2. SPOT 6 (2002)<br>3. PARASOL (2009)<br>4. MEGHA-TROPIQUES (2011)<br>5. SPOT 7 (2012) |
| **Guyana** | - | No | - |
| **Peru** | CONIDA | Yes / 3 | 1. PERUSAT-1 (2016) |
| **Suriname** | - | No | - |
| **Venezuela** | ABAE | Yes / 3 | 1. VRSS-1 (2012)<br>2. VRSS-2 (2017) |

* Number of satellites in orbit according to the online index of objects launched into outer space by the United Nations Office for Outer Space Affairs (UNOOSA).
** French Guiana in grey, since it is not an autonomous region nor signatory of the Leticia Pact nor contracting party of the ACTO.

The first monitoring developments by the region through satellite remote sensing took place in Brazil, as a result of a partnership with China for the CBERS programme. In the early seventies, remote sensing with regard to the reception of data was already widespread in Brazil, culminating with the installation of antennas for receiving data from the US satellite Landsat in 1973. Brazil was the third country in the world (after the USA and Canada) to have a reception system.[279] Training in the analysis of remote sensing data was key for cooperation with China in the CBERS programme in 1988.

[279] INPE website, *Divisão de Geração de Imagens*.

The programmes' first satellite – CBERS-1 – was launched in 1999.[280] Currently, CBERS-4 and CBERS-4A are in orbit, providing data for monitoring the environment, verifying deforestation, natural disasters, as well as agriculture and cities expansion, among other applications.[281]

Amazonian countries already agreed on the importance of cooperation for the conservation of the rainforest for the benefit of its population, recognizing that in such a large region, uncoordinated and isolated actions are not efficient to address a global issue. The technical aspect of space cooperation is emphasized through knowledge transfer from Brazil to its contracting parties' counterparts.

In 2013, ACTO signed an agreement with INPE for the training of technicians in the management of tools for environmental monitoring in the Amazon region, aiming to establish a coordinated regional system for monitoring the forest cover, contributing to the governance of issues related to deforestation and land use in the region, taking as a reference the methodologies and technologies developed by the Brazilian institute.[282]

INPE maintains in operation three systems to monitor deforestation in the Amazon: PRODES, the Real-Time Deforestation Detection System (DETER) and DETER-B, both independently but also complementary.[283] PRODES reveals the annual rate of clear-cut deforestation, when the entire set of trees in the forest is removed. DETER is less detailed than PRODES because it uses sensors that cover the Amazon more often, but with images of lower spatial resolution, used to quickly inform inspection bodies about deforestation. DETER-B identifies and maps, in near real time, deforestation and other changes in forest cover with a minimum area close to 1 hectare.[284]

280 INPE website, *CBERS*.
281 Ibid.
282 INPE website, *INPE e OTCA firmam acordo para monitorar desmatamento nos países amazônicos*, 2013.
283 INPE website, *Metodologia Utilizada nos Projetos PRODES e DETER*, 2019.
284 DETER-B replaced DEGRAD, which used to identify areas that could not be classified as clear cut but are already affected by deforestation. The DEGRAD project was discontinued in December 2016.

The Brazilian programmes use images from several satellites for temporal analysis: Landsat-5/TM (US), TERRA (US), CBERS-2/2B, IRS-1 (India) and UK-DMC2 (UK). Currently, Landsat 8/OLI, CBERS 4/4-A and IRS-2 are the most used.[285] There is another Brazilian satellite remote sensing which will be launch in 2020 – Amazonia-1 – with a view to provide data to observe and monitor deforestation, acting in synergy with the existing environmental programmes, especially in the Amazon region.

Cooperation through ACTO resulted in the transfer of knowledge and technology in order to assist contracting parties in the development of their own systems to monitor deforestation, even if only in the analysed information phase.

In regard to national's capacity, apart from Brazil, Colombia, Peru and Venezuela developed their own satellites for remote sensing. In 2016, Peru, in partnership with Airbus, launched PERUSAT-1 for civil and military applications, providing a very-high-quality imagery with a view to monitoring borders, preventing natural disasters, agricultural planning and water resources management.[286] In 2018, the Colombian satellite FACSAT-1 was launched, seeking to achieve two objectives: "to detect changes in illegal open pit mining vegetation in rural areas of the country and to improve satellite communications by the Colombian air force in Antarctica by installing a temporary ground station"[287]. Venezuela launched two remote sensing satellites in order to capture high-resolution images of its territory: VRSS-1 and VRSS-2.[288]

Regional space cooperation, not only for the Amazon, but for the whole South America or even Latin America, may lead to significant short-term progress in the protection of natural reserves with the consequent environmental conservation and the reduction of the effects of global warming, as well as the monitoring of

285 INPE website, *Observação da Terra, PRODES – Amazônia.*
286 Airbus website, *PeruSat-1 Mission*.
287 Colombia, *Comando General, Colombian Satellite FACSAT-1 of the Colombian Air Force, one year in space*, 2019.
288 ESA website, *Sharing EO Resources, VRSS-1*.

hydrographic basins, seeking to identify and prevent possible natural disasters. Few countries of the region have started to develop their own mechanisms to monitor its Amazon territory, with emphasis to the project led by Brazil, which through ACTO expanded its technical capacities to its counterparts. However, a joint space regional project involving all Amazonian states in order to cooperate on scientific, technical, economic, political and legal aspects still does not exist. Furthermore, the new Leticia Pact may support the cooperation in the regional space sector by creating a mechanism to the sharing of data through its current Action Plan by establishing means to do so, like an additional protocol to the Pact.

#### *4.3.3.1 The experience from the Copernicus Programme*

The Copernicus EO Programme was established by Regulation 377/2014 of the European Parliament and the Council,[289] based on a partnership between the EU, ESA and various Member States, aiming at providing services that allow timely, accurate, reliable access to data and information on the environment, civil protection and citizen security.

Three components are the basis of the Programme: (i) the space component directed to EO through remote sensing satellites (SENTINEL mission); (ii) the *in situ* component, with the same purpose but using ground infrastructure; and (iii) the services component, that provides information in an agile manner for citizens and entities with responsibilities in the areas of resource management, security and civil protection.[290]

The data from the SENTINEL satellites is available and accessible to any citizen and any organisation around the world on a free, full and open access policy, at no cost.[291] In addition, the regulation does not provide explicit access restrictions for users from third countries. The chosen data policy aspires to produce a global

289 Regulation (EU) No 377/2014 of the European Parliament and of the Council of 3 April 2014 establishing the Copernicus Programme and repealing Regulation (EU) No 911/2010.
290 EU website, *Copernicus*, About, 2020.
291 Copernicus data and information policy Regulation (EU) no. 1159/2013 of 12 July 2013.

impact. However, access to third countries is under licensing condition, according to the Article 23, para. 2, (a) from the cited Regulation.

In 2018, with a view to expanding the program, the European Commission signed a cooperation agreement with Brazil, Colombia and Chile, so that these countries can participate in the Copernicus programme, having access to the information gathered by the SENTINEL satellites. In return, the Latin American countries will share the results of the analysis of this information with the other participants in the system.[292]

### *4.3.4. Implementing the Leticia Pact through Space Cooperation*

Space cooperation is fundamental to achieve the objectives of the Leticia Pact. There are four points (1, 3, 6 and 7) from the Pact where satellite remote sensing plays a fundamental role as in regard to fulfil the goals from the axes *i*, *ii*, *iii* and *v* stated in the Action Plan. Despite the key actions lacking precision in how to achieve the objectives, they are guidelines that can be better discussed on the national level policies of these countries. However, a regional mechanism for the exchange of satellite data must be agreed at an international cooperative level.

The division of goals must be clearly established, so that a country does not end up being responsible for most of the actions, and that their sovereignty is respected so as not to cause conflicts.

The need for establishing legal mechanisms to complement the Pact and its Action Plan goes in hand with its effectiveness. Leticia's first point intends to strengthen coordinated actions, which is complemented by the first axis of the Action Plan in its point 3, aiming to implement a program to strengthen the technical monitoring capacity, including the generation and analysis of satellite data for monitoring the Amazon region.

[292] FROEHLICH, A., SORIA, D., DE MARCHI, E., 2020, p. 79.

The Amazonian countries already monitor its territories by remote sensing technologies, but the regional cooperation through data sharing is non-existent. The previous experience of cooperation was carried out through the project developed by ACTO on transferring of knowledge for the receiving and processing data from remote sensing satellites. Therefore, an effective way to implement the provisions of the first point of the Pact would be to re-establish the partnership between all Institutes (Table 1) of this project that already monitor the region under their jurisdiction. As the Pact proposes to work together with the ACTO, the use of this means would be functional, since it would not need to spend more resources for the creation of new institutes and training of personnel.

In regard to the third point of the Pact, it is perhaps the most direct, by already establishing the creation of an Amazon Network for Natural Disaster Cooperation (ANDC). This new Centre must act in coordination with Emergency Operations Centres in each country. The viability of this Centre will require close cooperation, mainly for disaster prevention. The Action Plan proposed to develop it within a period of two years in its axis *ii*, but it is not clear on which technology will be utilized. If by satellite remote sensing cooperation, taking into account that all countries already have an Observation Room – established through ACTO – to monitor deforestation based on the use of satellite data, this point can be addressed together with the already existent mechanism. In order to maintain the Centre, the resources may come from the creation of the investment fund offered by the Inter-American Development Bank (IDB) at the II Presidential Summit or even from other financial mechanisms as stated in the point 15 of the Pact and axis *v* from the Action Plan.

The sixth and seventh point can be analysed together, since they aim to increase the efforts for monitoring capabilities by exchanging information. The axis *iii* of the Action Plan refers to coordination and cooperating for capacity building. Signatory states can take advantage of existing technologies and knowledge from other signatory countries, without having to spend resources for their development. Herewith, it is possible to take advantage of Brazilian technology developed by INPE for monitoring deforestation in real time – DETER –, for example; this technology

can be expanded to the entire Amazon basin, at a much lower cost than if each country needed to create its own technology.

In addition, Brazil is planning to launch a new satellite mission to monitor its part of the Amazon – AMAZONIA 1 – in 2020, resulting in another source of data that can be useful for other Amazonian states. Colombia, Peru and Venezuela already have cooperation programs with AEB. Colombia, in particular, agreed on training and education in remote sensing and digital images.[293] Nonetheless, cooperation on satellite data still lacks an agreement.

Thus, the first step is to establish real and tangible actions, such as halting deforestation, through policies that use satellite data sharing as the main source. The signatory countries must coordinate strategies to act and initiate effective collaboration. In observance to the principles analysed in this section, it is feasible to develop a legal document under international law, especially under the UN Charter, the MEA and the Remote Sensing Principles.

#### *4.3.4.1 Proposal of an Additional Protocol to Leticia Pact on Data Sharing Policy to enhance Space Cooperation*

Taking into account the intentions on regional cooperation for the Amazon, through the ACTO, it is feasible to ponder the need for an additional Protocol to the Leticia Pact in order to establish a framework for long-term policies on satellite data sharing and hence the development of the regional space sector. The Protocol may help boosting the establishment of a legal framework on space activities, which is still lacking in the region.

The commitments agreed upon by the signatories of the Leticia Pact and its Action Plan find satellite data as a useful tool. The relevance of using satellite remote sensing for the collection and analysis of information on deforestation has been

[293] FROEHLICH, A., SORIA, D., DE MARCHI, E., 2020, p. 232.

demonstrated since 1988.[294] The additional Protocol would aim to provide a methodology for implementing the principles listed in the Leticia Pact with regard to data sharing between countries in the region, with the ultimate goal of implementing effective and coordinated policies.

Thus, a regional mechanism, such as the proposed ANDC, can be an effective means of coordinating the exchange of information between signatory countries and improving practices for the effectiveness of the principles set out in the documents, as well as strengthening the almost non-existent space cooperation in the Amazon region. The ANDC can work directly with the space agencies/space authorities responsible for space matters in these countries to extend the objectives of Amazonian cooperation to strengthen ties in the space sector as well.

In this regard, practical aspects of space applications would be combined with the region's political will in space cooperation. The additional Protocol would be the first step to be developed by the signatory countries. In case of success, there would subsequently be coordination of space agencies and authorities in the Amazon region to facilitate the use of satellite data for the conservation and sustainable development of the region.

In general terms, the Additional Protocol to the Leticia Pact would be adopted to meet common objectives, with clear rights and obligations, establishing the advantages of participation by the signatory countries. However, it is difficult to identify the extent to which Amazonian countries are prepared for space cooperation.

Amazonian countries already have developed legislation to deal with deforestation. So, the idea of an additional Protocol is to establish a mechanism with clear rules and goals to be developed through coordinated policies. Moreover, it would facilitate decision-making by parts of the states of the Leticia Pact at Presidential Summit meetings. Developing and implementing a deforestation monitoring system based on satellite data, to produce reliable information on the space and real time distribution of the deforested area, facilitate concerted

[294] The year Brazil started monitoring the region by satellite.

government actions to control illegal deforestation. In addition, the ANDC could also play a supervisory role, as countries in the Amazon region often lack the capacity to address threats immediately. However, this topic deserves a more in-depth discussion, as it involves the states' sovereignty.

On an international level, the main instruments on the subject, although not binding, such as the G8 Open Data Charter, the GEO Data Sharing Principles and the World Meteorological Organization Resolutions, argue that public data should generally be made available free of charge.[295]

In opposition to an open data policy, it is needed to consider that the Amazon region has a very clear aspect of national sovereignty and, moreover, it is a porous frontier, with a series of concerns of national interest and security that must be taken into account. In general, states are worried only with collecting information from its territories of the Amazon without a holist view.

The scope of the additional Protocol should focus on satellite data sharing with a view to organize the legal environment so that all existing entities can coexist. In this research, it is not included a draft of the additional Protocol on Data Sharing Policy, because the key elements for its drafting must be decided by the signatory countries. Nevertheless, it is needed to observe some basis on data sharing policy.

The preliminaries should consist on defining some terms that would be at the core of the Protocol, such as: 'satellite data' and 'data sharing policy'. In regard to satellite data, the Protocol can invoke the UN Resolution 41/65 which defines the three types of data (primary data, processed data or analysed information). For data sharing policy, it is needed to know *(i)* what data will be shared (in this case satellite data, but from which source? Satellites from signatory countries? Is there a need to cooperate with other space agencies, organizations or countries?); *(ii)* with whom (Leticia's signatory countries); *(iii)* under what conditions (free?); and lastly, *(iv)* if there

295 NextSpace, *Study on the Copernicus Data Policy Post-2020 implementing Framework contract No 386/PP/2014/FC (30-CE-0672813/00-46*), 2019.

is any restriction or sensitiveness (can the receiver redistribute it?).[296] Together with the data sharing policy, it must be addressed the training of personal to process the data received counting on the cooperation of countries with capabilities and experience in doing so. Moreover, it is important to give free access to researches, enabling the development of science in the region.

The Pact didn't specify if it will have an open data policy, but considering the statements by the Brazilian President[297] and following the ACT, the intention is to avoid any type of external interference in the region and strengthening the sovereignty over the territories.

The aim for an additional Protocol comes with the consideration to provide a regulation to data sharing and a common access to information, in order to coordinate its decision-making process to conserve and develop the region. Finally, this additional instrument is extremely relevant to the very purpose of the Leticia Pact.

[296] BOROWITZ, M., 2017, p. 213.
[297] BBC, *Bolsonaro cita 'interesse' em 'interferência na Amazônia' após encontro com príncipe Charles*, 2019.

# Conclusion

Law is a science that must reflect and follow the changes experienced by society, providing legal certainty through its regulation. International environmental law and international space law, as branches of international law, developed mainly from the states' interest in cooperation, with significant participation from developing countries, especially Latin American, including the Amazon countries.

Legal cooperation does not seem to be the biggest obstacle for the development of regional space cooperation in Latin America. As explained in the first three chapters, in general these countries participated actively in the development of the main international agreements in the space sector and also in the recognition on the need for joint actions to protect the environment.

Despite the commitment to international cooperation, what is observed is a persisting regional cooperation gap on effective policies, representing a long process to be covered by Latin American countries, mainly due to the various obstacles faced to develop their industry, training, the limited programs for the development of space research with unstable policies for education, while states are seeking to develop at all levels simultaneously, facing immediate problems and building the necessary infrastructure to serve its nations in the long term. Notwithstanding the different levels of development among the Amazon countries in the space sector, justification for a wider cooperation includes the similar characteristics shared by them and the common interest in the Amazon rainforest through ACTO.

ACTO has great relevance to foster cooperation between Amazonian countries in satellite remote sensing. However, in the South American political framework, the organization is eclipsed by other regional blocs, MERCOSUR, CAN, UNASUR. The ACT is an umbrella treaty, that is, an instrument whose effectiveness depends on the conclusion of future agreements, but until now, what could be verified is that the acronym is invoked when any probable threat of resumption of speech is

identified internationalization of the Amazon. The organization's concrete actions are few.

During 2019, ACTO was put on stand-by with the arising of the Leticia Pact in order to address the same matters, but with exclusion of Venezuela from the discussions. The Pact has the potential to contribute to improving the quality of life of the population spread across the signatory Amazonian states. A constant interstate dialogue is vital because the degradation in a territory can compromise the balance of the regional system. The layout of the Amazon river makes this very clear: although its largest portion is within Brazilian territory, many of its tributaries are located in neighbouring countries. The same may be said about indigenous peoples and transnational natural resources; an efficient national policy and a disorderly environment across the border are worthless.

The Leticia Pact basically recalls international obligations already committed in the past by these same states in terms of cooperation, lacking substantive and binding measures, as it leaves its implementation at the mercy of the political will. The Pact looks like an attempt to respond to international pressure, basically consisting on a declaration of intent. The most concrete action may have been to "create the Amazon Network for Natural Disaster Cooperation among the region's Emergency Operations Centres to coordinate and articulate national systems of disaster prevention and management", but initially without any binding power. It was not the enactment of legislation or declarations of intent that have been lacking until now to protect the Amazon, but the will to put them into practice. The fact that two Amazon states (France and Venezuela) were not invited to participate in this meeting is a limitation by itself.

This research concluded that the provisions of the Leticia Pact are insufficient to guarantee its standardized implementation throughout the Amazon, requiring an additional protocol with clear objectives and means for the effectiveness of the agreement, especially for the exchange of information and satellite data sharing.

The relevance of conservation in the region is a constant theme in international discussions and its monitoring by satellite remote sensing is demonstrated to be the most effective way of doing so. The technology of remote sensing has evolved significantly in the last decades, but it has not been accompanied by the proper regulation, as analysed in Chapter 2. An international convention to regulate satellite remote sensing activities is still the desire of several countries, mainly developing ones.

Although the region has not developed a legal framework to regulate satellite remote sensing activities, the activities carried out by ACTO in knowledge sharing, mainly by Brazil with neighbouring countries, as well as in the cooperation of transmission of primary data to observation centres of contracting states, may support the re-implementation and the improvement of this project together with the Leticia Pact, leading to political discussion to regulate the subject in the regional and domestic law.

The lack of regulation, especially on satellite data sharing, creates problems such as negotiating with other states. In order to fill this gap, contracting states use integration techniques, mainly in the case of bilateral agreements, contracting under the regulation of the states that have it, sometimes contrary to the provisions of Resolution 41/65.

The development of regional space cooperation would facilitate and increase investments, dividing costs and risks, increasing the number of projects, stimulating the opening of new markets, dynamizing the industry and gives it sustainability, increasing the safety and reliability of products and services, thus solving regional and global problems. But for cooperation to be effective, it is necessary to negotiate legal instruments that effectively express the equality of the parties in the recognition of their legitimate interests and in the sharing of benefits.

In view of the cross-border nature of activities, it is required to act in compliance with the international norms and practices that currently drive space activities. Mastering the main theories, techniques and legal formulas used in the

global arena is extremely important for states to be able to effectively defend their interests in this field.

Another relevant point relies on the importance for states to develop their own systems, due to the sovereignty strategic value of data when it comes to decision making. As sovereign states rely on this information, ensuring the independence of data becomes more important, with a view of protecting against breaches in third party data flows, controlling geographic areas where data is acquired and also avoiding reliance on third party data collection.

These activities require regulation consistent with international law, even the restrictions that each state may impose for reasons of national security. Countries that do not have specialized national space legislation are beginning to consider that countries with legislation on the matter have a lot of influence on different markets.

However, despite the experience with the regional forest monitoring project through ACTO, it is not seen a specific long-term partnership in the space sector through the Leticia Pact without an additional Protocol. In addition, no attempt was found to cooperate in the space sector through the other regional blocs with a view to conserving the Amazon rainforest, despite some states pointing to the need for Latin American space cooperation.

In this sense, taking into account these premises, it is concluded, in relation to the proposed theme, that regional cooperation for satellite remote sensing has slowly evolved with a view to the monitoring of the Amazon rainforest, a reality that has already been implemented through the ACTO and it seems to be implement in a near future starting with the Action Plan of the Leticia Pact. Amazonian states are recognizing that our global environmental security relies on space capabilities, mainly in regions not having sufficient existing ground-based infrastructure. However, there is still a long way to go, from the perspective of legal cooperation on satellite data sharing policies. The Amazon deserves and requires a much more convincing level of regional commitment.

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This section is divided in four types of references: *(i)* Books, Articles, etc.; *(ii)* References without an Author, websites; *(iii)* Treaties and Conventions; and *(iv)* Other Instruments, Cases and Documents.

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# Appendices

## Appendix 1: Leticia Pact for the Amazon Region

The Heads of State and Heads of Delegation of the Plurinational State of Bolivia, the Federative Republic of Brazil, the Republic of Colombia, the Republic of Ecuador, the Republic of Guyana, the Republic of Peru and Republic of Suriname gathered in Leticia, Colombia, on 6 September 2019:

Reaffirming the sovereign rights of the countries of the Amazon region over their territories and their natural resources, including the development and sustainable use of those resources, as recognized by international law;

Aware of the value of the Amazon for the conservation and sustainable use of the biodiversity, as well as its tropical rainforest, which is the source of 20% of the planet's fresh water and a climate regulator, providing essential ecosystem services to support the sustainable development of Amazonian populations;

Having in mind than 34 million people inhabit the Amazon region, including indigenous and tribal peoples, and peoples in voluntary isolation and initial contact, possessing ancestral knowledge, traditional knowledge, and cultural and linguistic diversity, which must be considered and protected;

Reaffirming all the principles of the Rio Declaration on Environment and Development, and taking into account the United Nations Framework Convention on Climate Change, including the principle of common but differentiated responsibilities and respective capabilities, in light of different national circumstances, the Convention on Biological Diversity, the Convention to Combat Desertification and Land Degradation, the Convention on International Trade in Endangered Species of Wild Fauna and Flora; the Minamata Convention on Mercury; as well as regional agreements, such as the principles and purposes of Amazon Cooperation Treaty Organization (ACTO) and other relevant international agreements for the sustainable development of the Amazon region and global ecosystems;

Aware of the importance for the implementation and generation of synergies between the 2030 Agenda and its Sustainable Development Goals, the Paris Agreement, and the process of building a global framework for biodiversity after 2020;

Reaffirming that for the conservation and sustainable development of the Amazon the efforts of the amazon countries are required, and expressing their concern about the deforestation and forest degradation that is occurring by different causes in each of the countries, bearing in mind their respective regulatory frameworks, including those causes of deforestation that, according to necessary evidence, could be linked to climate change and its structural causes, and expressing their commitment to increase national and regional efforts to tackle this problem in a comprehensive and urgent way;

Reaffirming that the cooperation among Amazonian countries is an important condition for the conservation of the Amazon region, to generate opportunities for sustainable development and well-being of its populations;

Considering that, even though there are mechanisms and financial programs established, including multilateral banks, that complement the efforts of Amazonian countries and that contribute to the solution of these challenges, the provision and mobilization of financial resources must be increased to achieve the commitments established within the framework of these mechanisms in order to obtain this objective;

Encouraging the international community to cooperate for the conservation and sustainable development of the Amazon region, on the basis of respect for their respective national sovereignty, priorities, and national interests, we decide to sign the following:

LETICIA PACT FOR THE AMAZON REGION

**1.** Strengthen coordinated action for forest and biodiversity assessment, as well as to fight against deforestation and forest degradation, based on national policies and their respective regulatory frameworks.

**2.** Establish regional cooperation mechanisms and the exchange of information allowing to combat illegal activities threatening the conservation of the Amazon region;

**3.** Create the Amazon Network for Natural Disaster Cooperation among the region´s Emergency Operations Centers to coordinate and articulate national systems of

disaster prevention and management in order to effectively address emergencies of regional impact, such as large forest fires scale.

**4.** Exchange and implement experiences to the comprehensive management of fires, encouraging the development of policies, instruments and technical actions, based on the prevention of forest fires, the promotion of alternatives to the use of fires in the rural areas and the strengthen of technical, scientific and institutional capabilities.

**5.** Specify accelerated restoration, rehabilitation, and reforestation initiatives in areas degraded by forest fires illegal activities, including, illegal extraction of minerals, with the goal of impact mitigation, recovery of species, and ecosystem functionality.

**6.** Increase efforts associated with monitoring forest cover and other strategic ecosystems in the region in order to have periodic reports, in particular, regarding the generation of an early deforestation and degradation alert system to act with a preventive approach.

**7.** Exchange information to improve the monitoring capabilities of climate, biodiversity, water, and hydrobiological resources of the region under a watershed approach, and based in communities.

**8.** Promote initiatives for connectivity of priority ecosystems and mechanisms for biodiversity conservation through sustainable use, restoration, and landscape management, respecting national sovereignty.

**9.** Exchange and implement experiences in the management of the systems of protected areas of the Amazon countries at regional, national and subnational levels for their effective management and for the benefit of the local populations, through the promotion of the development of conservation and sustainable use of programs and projects.

**10.** Strengthen the mechanisms that support and promote the sustainable use of forests, sustainable productive systems, responsible consumption and production patterns that promote value chains and other sustainable production approaches, including, those based on biodiversity.

**11.** Promote joint action aimed to the empowerment of women inhabiting the amazon region to encourage their active participation in the conservation and sustainable development of the Amazon region.

**12.** Strengthen the capacities and participation of indigenous and tribal peoples, and local communities in the sustainable development of the Amazon region, acknowledging their fundamental role in the conservation of the region.

**13.** Promote research, technological development, technology transfer, and knowledge management processes with the purpose of guiding the adequate decision-making and promoting the development of sustainable environmental, social and economic entrepreneurship.

**14.** Develop and articulate between the Amazon countries education and awareness-raising activities on the role and function of the Amazon, the main challenges and threats it faces for its conservation, the sustainable use of forests, the protection of traditional knowledge of the communities that inhabit it, and disaster risk scenarios for strengthening the resilience of Amazonian populations.

**15.** Work together to strengthen the programs and financial mechanisms, reiterate the commitments made by countries in these scenarios, mobilize public and private resources, including the multilateral banks, as appropriate, for the implementation of this Pact.

**16.** Promptly move forward in the formulation of the second phase of the Amazon Sustainable Landscapes Program under the Global Environmental Facility.

WE DECLARE

Our willingness to adhere to this Leticia Pact for the Amazon Region.

Our commitment to coordinate, through the Ministries of Foreign Affairs and the competent authorities, the formulation of a plan of action for the development of the actions adopted, as well as the convening of follow-up meetings to evaluate the progress in the formulation and implementation of the said plan.

Our intention to cooperate with and our call to other interested States, to the Amazon Cooperation Treaty Organization (ACTO) and to other regional and international organizations to cooperate for the attainment of the actions here agreed, building in harmony with national efforts and in response to the national requests made by the Amazon countries that signed this Pact, and with full respect of their sovereignty.

# Appendix 2: Plan de Accion - Pacto de Leticia por la Amazonía*

*The original document lists the number of actions by axes; I chose to renumber all of them from 1 to 52 to facilitate their mention and avoid repetition.

**EJE I: REFORESTACIÓN, CONSERVACIÓN, USO SOSTENIBLE DE LOS BOSQUES Y LA BIODIVERSIDAD Y PROMOCIÓN DE LA BIOECONOMÍA (MANDATOS 1, 5, 8, 9 Y 10).**

Mandato 1. Fortalecer la acción coordinada para la valoración de los bosques y la biodiversidad, así como para luchar contra la deforestación y degradación forestal, con base en las políticas nacionales y sus respectivos marcos regulatorios.

**1.** Desarrollar e intercambiar estrategias para el uso, manejo y aprovechamiento sostenible de productos de la biodiversidad del bosque, para la generación de beneficios a las poblaciones locales que habitan ecosistemas boscosos.

**2.** Identificar y promover cadenas de valor para el comercio en la Amazonía, tales como zonas francas u otros mecanismos, que incluya la red de intercambio de experiencias con los países del Pacto de Leticia.

**3.** Implementar un programa de fortalecimiento de capacidades técnicas para monitoreo de la superficie del bosque y la deforestación y degradación forestal y de suelos, que incluya la generación y análisis de imágenes satelitales para el monitoreo de la región amazónica, y otras metodologías.

**4.** Establecer un diálogo permanente entre las autoridades competentes de los países para acceder a mayores beneficios respecto a los programas de pagos por resultados y otros mecanismos y enfoques no basados en el mercado, en el marco del Pacto de Leticia.

**5.** Fortalecer el diálogo y la cooperación en actividades vinculadas al ordenamiento del territorio y su gestión integral.

Mandato 5. Concretar iniciativas de restauración, rehabilitación y reforestación acelerada en las zonas degradadas por incendios forestales y actividades ilegales incluyendo la extracción ilegal de minerales con miras a la mitigación del impacto, y recuperación de especies y funcionalidad de ecosistema.

**6.** Implementar la gestión del riesgo de desastres basado en el conocimiento de los ecosistemas y de las comunidades para prevenir estos peligros en la Amazonía, así como priorizar a nivel nacional las áreas de intervención, intercambiar experiencias y trabajar en un portafolio sobre medidas de reducción de riesgo.

**7.** Impulsar e implementar a nivel regional iniciativas para la restauración de áreas degradadas con énfasis en el ecosistema amazónicos, tales como la iniciativa 20X20.

**8.** Mejorar la restauración, rehabilitación y reforestación a través de sistemas agroforestales y de restauración ecológica para atraer oportunidades económicas y beneficios a las poblaciones locales.

**9.** Compartir tecnologías y experiencias para la recuperación de los bosques, la restauración ecológica de ecosistemas y de áreas degradadas dentro y fuera de las áreas nacionales protegidas para formular proyectos que contribuyan a la conectividad de los ecosistemas, respetando las soberanías nacionales.

**10.** Lanzar campañas de sensibilización y educación para el fomento de la restauración que incluya a todos los actores involucrados, con el objetivo de recuperar ecosistemas afectados por incendios, y por la minería y tala ilegal, entre otros factores.

Mandato 8. Promover iniciativas de conectividad de ecosistemas prioritarios y figuras de protección para la conservación de la biodiversidad por medio del uso sostenible, restauración y gestión de paisajes, respetándose las soberanías nacionales.

**11.** Diseñar y caracterizar espacios de conectividad de ecosistemas (áreas protegidas) que contribuyan a la conservación y uso sostenible de la biodiversidad, especialmente de especies emblemáticas y prioritarias a nivel amazónico y que cuenten con planes nacionales de acción o instrumentos de gestión para su implementación de acuerdo a sus prioridades y legislaciones nacionales.

Mandato 9. Intercambiar e implementar experiencias en el manejo integrado de los sistemas de áreas protegidas de los países amazónicos en los niveles regional, nacional y subnacional para su gestión efectiva y en beneficio de las poblaciones locales, a través de la promoción del desarrollo de programas y/o proyectos de conservación y uso sostenible

**12.** Desarrollar programas para la generación de ecoturismo sostenible en áreas naturales protegidas, con participación de pueblos indígenas, poblaciones locales e iniciativa privada como estrategia de conservación y desarrollo sostenible.

**13.** Fortalecer las diferentes plataformas regionales de cooperación de las cuales son parte los países del Pacto de Leticia para desarrollar capacidades e intercambio de experiencias en áreas naturales protegidas y otras modalidades de conservación en temas de gestión efectiva, amenazas y presiones, gobernanza, representatividad, servicios y funciones ecosistémicas, incendios forestales, buenas prácticas y espacios de conservación fronteriza.

**14.** Fortalecer las iniciativas de gestión colaborativa entre áreas naturales protegidas colindantes en zonas de frontera de la región amazónica, a partir de experiencias exitosas.

Mandato 10. Fortalecer los mecanismos que apoyen y promocionen el uso sostenible del bosque, los sistemas productivos sostenibles, los patrones de producción y consumo responsable y que promuevan las cadenas de valor y otros enfoques de producción sustentable, incluyendo las basadas en biodiversidad.

**15.** Promover el consumo, la producción sostenible, la concientización como la eficiencia en el uso de los materiales, del agua y la energía y la gestión integral de residuos y desechos como el plástico y otros materiales.

**16.** Impulsar emprendimientos innovadores y la gestión de las cadenas productivas libres de tala ilegal y el cambio de uso del suelo no permitido.

**17.** Fortalecer el Observatorio Regional Amazónico (ORA) como mecanismo para apoyar a los países amazónicos en la conservación y uso sostenible de la biodiversidad y territorio, incluyendo programas y proyectos de zonificación y ordenamiento territorial, manejo de recursos pesqueros de la Amazonia, manejo de los territorios comunales y de territorios (no titulados) de usos ancestrales por comunidades locales y pueblos indígenas, bajo planes de vida y planes de manejo de recursos.

**18.** Impulsar alianzas y acuerdos que permitan la capacitación, asesoramiento, investigación, desarrollo, uso y transferencia tecnológica limpia en los procesos de transformación de los productos de los bosques y la biodiversidad, particularmente a los actores y a las comunidades locales.

**19.** Articular los centros de investigación para intercambiar experiencias y realizar acciones conjuntas para el manejo forestal sostenible, el desarrollo de planes de manejo de especies silvestres, y/o la implementación de sistemas productivos agroforestales que aporten a la competitividad de cadenas de valor, así como la generación de bases técnicas de restauración, recuperación y rehabilitación ecológica.

**20.** Fortalecer y consolidar organizaciones productivas y desarrollar estrategias de negocio para la comercialización sostenible de productos del bosque.

**EJE II: SEGURIDAD AMAZÓNICA (MANDATOS 2, 3 Y 4).**

Mandato 2. Establecer mecanismos de cooperación regional y de intercambio de información que permitan combatir las actividades ilegales que atentan contra la conservación de la Amazonía.

**21.** Robustecer las capacidades nacionales y colaborar estrechamente para fortalecer los mecanismos de coordinación entre las autoridades nacionales responsables de la prevención, investigación, persecución y sanción de actividades ilegales y delitos ambientales, incluyendo el intercambio, en lo posible de forma virtual inmediata, de información sobre organizaciones criminales transnacionales.

**22.** Responder sin dilación y bajo los principios de legalidad, prontitud, oportunidad y buena fe, las solicitudes de cooperación de los operadores de justicia para investigar y procesar delitos contra la minería ilegal, los cultivos ilícitos, la tala ilegal, el tráfico ilícito de flora y fauna silvestre y su repatriación, biopiratería y otros delitos vinculados con el medio ambiente en la región amazónica.

**23.** Con el fin de combatir las actividades ilegales en la Amazonía, promover los emprendimientos económicos alternativos y procesos como la zonificación y regulación de actividades forestales legales y la formalización de las actividades mineras en la región bajo criterio de sostenibilidad, y respetando las legislaciones ambientales de los países.

Mandato 3. Crear la Red Amazónica de Cooperación ante desastres naturales entre los Centros de Operaciones de Emergencias para coordinar y articular los sistemas nacionales de prevención y atención de desastres con el objeto de atender de manera efectiva las emergencias de impacto regional, como incendios forestales de gran escala.

**24.** Desarrollar todas las fases y protocolos de la Red Amazónica de Cooperación para Desastres Naturales entre los Centros de Operaciones de Emergencia de los países firmantes del Pacto de Leticia en un plazo de dos años.

Mandato 4. Intercambiar e implementar experiencias en el manejo integral del fuego, fomentando el desarrollo de políticas, instrumentos y acciones técnicas, basadas en la prevención de incendios forestales, la promoción de alternativas al uso del fuego en el medio rural y el fortalecimiento de capacidades técnicas, científicas e institucionales.

**25.** Con el objeto de impulsar las actividades a favor de la protección, conservación y uso sostenible del patrimonio natural y sus paisajes, para prevenir y mitigar los incendios forestales, se realizarán eventos y campañas periódicas para aumentar la concientización y entrenamiento en prevención de las poblaciones locales y pueblos indígenas acerca de las alternativas y el uso controlado del fuego, así como compartir resultados y buenas prácticas en proyectos concernientes con el manejo integral del fuego.

**26.** Impulsar la creación del Grupo de Trabajo técnico en manejo integral del fuego (GTTMIF), conformado y coordinado por los entes técnicos nacionales competentes.

**EJE III GESTIÓN DE LA INFORMACIÓN Y DEL CONOCIMIENTO Y REPORTES (MANDATOS 6 Y 7, 13 Y 14).**

Mandato 6. Incrementar los esfuerzos asociados al monitoreo de la cobertura boscosa y demás ecosistemas estratégicos de la región con el fin de contar con informes periódicos, en particular, en lo que respecta a la generación de un sistema de alertas tempranas por deforestación y degradación para actuar con un enfoque preventivo.

Mandato 7. Intercambiar información para mejorar las capacidades de monitoreo del clima, la biodiversidad, los recursos hídricos e hidrobiológicos de la región bajo un enfoque de cuenca hidrográfica y basado en comunidades.

**27.** Fortalecer la coordinación y cooperación entre las instituciones competentes de los países del Pacto de Leticia, incluyendo las agencias generadoras de imágenes satelitales, para profundizar y mejorar el conocimiento, gestión, monitoreo, alertas tempranas y reporte(s) nacional y regional de los bosques amazónicos; incendios forestales; zonificación territorial y el cambio de uso del suelo; la medición de stocks de carbono; recursos hídricos e hidrobiológicos,; la biodiversidad y ecosistemas del bioma amazónico; el clima; contaminación (metales pesados); y , otros que exijan la conservación, la bioeconomía y el desarrollo sostenible de la Cuenca Amazónica, para cuyo efecto colaborarán en el fortalecimiento de las capacidades nacionales y se esforzaran en lograr al más breve plazo la interoperabilidad de los sistemas nacionales de información en tales âmbitos.

**28.** Intercambiar informes sobre la ciencia ambiental amazónica dando prioridad a variables relacionadas con hidrografía, climatología, biodiversidad, stocks de carbono, y

otras relacionadas, con vistas a fortalecer metodologías y comparabilidad de data en la región.

**29.** Mejorar la coordinación y cooperación entre las agencias y comités de agua para la gestión integral de los recursos hídricos y la conservación de los ecosistemas clave para la regulación hídrica.

Mandato 13. Fomentar procesos de investigación, desarrollo tecnológico, transferencia de tecnología y gestión del conocimiento con el propósito de orientar la adecuada toma de decisiones e impulsar el desarrollo de emprendimientos ambientales, sociales y económicos sostenibles.

Mandato 14. Desarrollar y articular entre los países amazónicos actividades de educación y creación de conciencia sobre el rol y función de la Amazonía, los principales retos y amenazas que enfrenta para su conservación y uso sostenible de los bosques y la protección de los conocimientos tradicionales, así como sobre los escenarios de riesgo de desastres para el fortalecimiento de la resiliencia de las poblaciones amazónicas.

**30.** Promover la mayor cooperación, preferiblemente en la forma de redes, entre los centros de investigación y la comunidad académica y científica (Grupo Académico y de Investigación de la Amazonía) que tenga como prioridad el estudio para la conservación y el desarrollo sostenible de la biodiversidad de la Amazonia, y que combine los saberes ancestrales y los conocimientos tradicionales. Asimismo, posicionar al Grupo Académico y de Investigación de los Países del Pacto de Leticia como un reconocido referente mundial sobre la base de evidencias científicas y objetivas respecto al estado de situación, vulnerabilidades endógenas y exógenas, retos y beneficios nacionales y globales que ofrece la Amazonía para el desarrollo sostenible de los países miembros del Pacto de Leticia y para los fines de las Convenciones pertinentes de las Naciones Unidas.

**31.** Solicitar a la Red de Centros de Investigaciones Amazónicas (RCIA) y a las Universidades Amazónicas, la generación de información relevante para orientar y asesorar la toma de decisiones de los gobiernos subnacionales de la zona amazónica en bioeconomía, economía circular y desarrollo sostenible, y otros asuntos ambientales, de acuerdo a las prioridades de los países amazónicos.

**32.** Desarrollar planes de educación ambiental con énfasis en la gestión sostenible de los ecosistemas amazónicos y la valorización de los conocimientos tradicionales y el

papel de la mujer. Para ese propósito, se comprometen a intercambiar sus experiencias y buenas practicas nacionales y subnacionales en esta materia con el fin que los países interesados puedan replicarlos.

**33.** Desarrollar investigación científica y desarrollo tecnológico a partir de los subproductos derivados de procesos de transformación de la biodiversidad, a fin promover la competitividad de las cadenas de valor y la sostenibilidad económica y ambiental de organizaciones, empresas y emprendimientos.

**34.** Impulsar el intercambio de experiencias locales de consumo y producción sostenible, con el fin de identificar y promover las capacidades de las comunidades locales en el desarrollo de emprendimientos acorde con sus estilos de vida y en armonía con la naturaleza.

**35.** En cumplimiento del ODS 9, lograr la más amplia conectividad digital y telefónica en el área geográfica que cubre la región amazónica de los países firmantes del Pacto de Leticia.

**EJE IV: EMPODERAMIENTO DE LAS MUJERES Y PUEBLOS INDÍGENAS (MANDATOS 11 Y 12).**

Mandato 11. Impulsar acciones conjuntas orientadas al empoderamiento de las mujeres que habitan la región amazónica para fortalecer su participación activa en la conservación y desarrollo sostenible de la Amazonía.

Mandato 12. Fortalecer las capacidades y la participación de los pueblos indígenas y tribales y de las comunidades locales en el desarrollo sostenible de la Amazonía reconociendo su papel fundamental en la conservación de la región.

**36.** Promover la participación de las mujeres en la formulación, implementación y evaluación de políticas y programas orientados a la conservación y desarrollo sostenible de la Amazonía, incluyendo su importante papel en mitigación y adaptación al cambio climático.

**37.** Fortalecer los sistemas estadísticos con enfoque de género que permitan diseñar indicadores de género vinculados con la gestión del bosque y biodiversidad con el objetivo de identificar, por un lado, los impactos de los cambios ambientales en las mujeres, y por el otro, identificar las medidas necesarias para fortalecer su participación en la conservación y la construcción de un desarrollo sostenible en la Amazonía.

**38.** Crear y/o ampliar una red de mujeres emprendedoras amazónicas a fin de intercambiar experiencias y buenas prácticas en emprendimientos innovadores que contribuyan a poner en valor los productos de la Amazonía, generando alternativas de desarrollo sostenible y estimulando alianzas público-privadas que fortalezcan estas iniciativas.

**39.** Formular e implementar programas y proyectos dirigidos a que los pueblos indígenas puedan hacer un aprovechamiento sostenible y colectivo del bosque y biodiversidad, atendiendo a sus características particulares (lingüísticas, culturales, organizativas, socio-económicas), así como que obtengan los beneficios que les correspondan por el uso de los recursos genéticos y sus conocimientos tradicionales.

**40.** Compartir experiencias de modelos de gestión territorial y ambiental de territorios indígenas, conforme a la legislación respectiva de cada país firmante del Pacto de Leticia.

**41.** Fortalecer programas y proyectos para el desarrollo y la revitalización de lenguas indígenas amazónicas en situación vulnerable.

**42.** Fortalecer las capacidades de los pueblos indígenas y de las comunidades locales, con énfasis en las mujeres, en las acciones para la gestión del riesgo de desastres.

**EJE V: FINANCIAMIENTO Y COOPERACIÓN INTERNACIONAL (MANDATOS 15 Y 16).**

Mandato 15. Trabajar conjuntamente para fortalecer los programas y mecanismos financieros, reivindicar los compromisos de los países asumidos en estos espacios, movilizar recursos públicos y privados, incluyendo la Banca Multilateral, según corresponda, para la implementación de este Pacto.

Mandato 16. Avanzar rápidamente en la formulación de la segunda fase del Programa Paisajes Sostenibles de la Amazonía ante el Fondo para el Medio Ambiente Mundial.

**43.** Diseñar iniciativas que incluyan dos o más países firmantes del Pacto de Leticia orientadas a la ejecución de uno o varios de los mandatos del Pacto con el fin de presentarlas e impulsarlas ante los mecanismos financieros.

**44.** Mapear y compartir las ofertas de cooperación internacional bilateral y multilateral existentes para la implementación de uno o varios de los mandatos del Pacto.

**45.** Trabajar la iniciativa del Fondo para el desarrollo sostenible y bioeconomia de la Amazonía, a ser administrado por el Banco Interamericano de Desarrollo, con enfoque en la participación del sector privado en el desarrollo de la región.

**46.** Tomar con satisfacción la decisión de la Unión Europea de escalar su financiamiento y cooperación a los países firmantes del Pacto de Leticia, a través de Euroclima+, para cuyo efecto se alienta a los puntos focales nacionales a coordinar acciones comunes ante la Comisión Europea y a promover proyectos en función de sus prioridades nacionales, preferiblemente de alcance regional.

**47.** Realizar un evento conjunto de alto nivel con la comunidad internacional, incluyendo los mecanismos financieros ambientales, para incrementar sustantivamente el financiamiento en favor de la conservación, bioeconomía, economía circular y uso sostenible de la Amazonía en función de las prioridades nacionales de los países firmantes del Pacto de Leticia.

**48.** Realizar gestiones conjuntas ante la banca multilateral y el sector privado para que contribuyan financieramente en la implementación del presente Plan de Acción bajo las distintas modalidades que ofrece el Acuerdo de París y las legislaciones nacionales de los países miembros del Pacto de Leticia.

**49.** Llamar la atención a la comunidad internacional en su conjunto que la Amazonía viene siendo fuerte y negativamente impactada por el cambio climático cuyo origen primario no está en los países firmantes del Pacto de Leticia y que en consecuencia es fundamental el respeto y cumplimiento de los compromisos financieros de la Convención Marco de las Naciones Unidas sobre cambio climático y su Acuerdo de Paris, así como con los principios de la Cumbre de Río de 1992, en particular el principio de la responsabilidad común pero diferenciada.

**50.** Impulsar un mayor uso del pago por resultados de actividades REDD+ para financiamiento forestal.

**51.** Instruir a las respectivas autoridades nacionales designadas ante el Fondo Verde del Clima que coordinen con el propósito de lograr una mejor representatividad y participación de los países firmantes del Pacto de Leticia en la toma de decisiones,

**52.** Adoptar e implementar la hoja de ruta para la formulación de la segunda fase del Programa Paisajes Amazónicos Sostenibles y presentar la propuesta de proyecto ante el Fondo para el Medio Ambiente Mundial en abril de 2020.

ACCIONES DE SEGUIMIENTO

1. Difundir nacional e internacionalmente el Pacto de Leticia y su Plan de Acción.

2. Designar Puntos Focales para el seguimiento en la implementación de este Plan de Acción y compartir información sobre posibilidades de cooperación y financiamiento.

3. Solicitar a nuestros representantes ante la Junta Directiva del BID trabajar en el diseño del Fondo para el desarrollo sostenible y bioeconomia de la Amazonía.

4. Solicitar a los respectivos Ministerios de Relaciones Exteriores que coordinen conjuntamente la convocatoria acordada en las acciones del mandato 15.

5. Los Ministros de Medio Ambiente convinieron sostener una próxima reunión durante el 2020 para revisar la implementación del Plan de Acción del Pacto de Leticia.

# Appendix 3: Resolution 41/65 on the Principles Relating to Remote Sensing of the Earth from Outer Space

*The General Assembly*,

*Recalling* its resolution 3234 (XXIX) of 12 November 1974, in which it recommended that the Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space should consider the question of the legal implications of remote sensing of the Earth from space, as well as its resolutions 3388 (XXX) of 18 November 1975, 31/8 of 8 November 1976, 32/196 A of 20 December 1977, 33/16 of 10 November 1978, 34/66 of 5 December 1979, 35/14 of 3 November 1980, 36/35 of 18 November 1981, 37/89 of 10 December 1982, 38/80 of 15 December 1983, 39/96 of 14 December 1984 and 40/162 of 16 December 1985, in which it called for a detailed consideration of the legal implications of remote sensing of the Earth from space, with the aim of formulating draft principles relating to remote sensing,

*Having considered* the report of the Committee on the Peaceful Uses of Outer Space on the work of its twenty-ninth session (A/41/20) and the text of the draft principles relating to remote sensing of the Earth from space, annexed thereto,

*Noting with satisfaction* that the Committee on the Peaceful Uses of Outer Space, on the basis of the deliberations of its Legal Subcommittee, has endorsed the text of the draft principles relating to remote sensing of the Earth from space,

*Believing* that the adoption of the principles relating to remote sensing of the Earth from space will contribute to the strengthening of international cooperation in this field,

*Adopts* the principles relating to remote sensing of the Earth from space set forth in the annex to the present resolution.

ANNEX

Principles Relating to Remote Sensing of the Earth from Outer Space

**PRINCIPLE I**

For the purposes of these principles with respect to remote sensing activities:

(a) The term "remote sensing" means the sensing of the Earth's surface from space by making use of the properties of electromagnetic waves emitted, reflected or diffracted

by the sensed objects, for the purpose of improving natural resources management, land use and the protection of the environment;

(b) The term "primary data" means those raw data that are acquired by remote sensors borne by a space object and that are transmitted or delivered to the ground from space by telemetry in the form of electromagnetic signals, by photographic film, magnetic tape or any other means;

(c) The term "processed data" means the products resulting from the processing of the primary data, needed to make such data usable;

(d) The term "analysed information" means the information resulting from the interpretation of processed data, inputs of data and knowledge from other sources;

(e) The term "remote sensing activities" means the operation of remote sensing space systems, primary data collection and storage stations, and activities in processing, interpreting and disseminating the processed data.

**PRINCIPLE II**

Remote sensing activities shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic, social or scientific and technological development, and taking into particular consideration the needs of the developing countries.

**PRINCIPLE III**

Remote sensing activities shall be conducted in accordance with international law, including the Charter of the United Nations, the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, and the relevant instruments of the International Telecommunication Union.

**PRINCIPLE IV**

Remote sensing activities shall be conducted in accordance with the principles contained in article I of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, which, in particular, provides that the exploration and use of outer space shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and stipulates the principle of freedom of exploration and use of outer space on the basis of equality. These activities shall be

conducted on the basis of respect for the principle of full and permanent sovereignty of all States and peoples over their own wealth and natural resources, with due regard to the rights and interests, in accordance with international law, of other States and entities under their jurisdiction. Such activities shall not be conducted in a manner detrimental to the legitimate rights and interests of the sensed State.

**PRINCIPLE V**

States carrying out remote sensing activities shall promote international cooperation in these activities. To this end, they shall make available to other States opportunities for participation therein. Such participation shall be based in each case on equitable and mutually acceptable terms.

**PRINCIPLE VI**

In order to maximize the availability of benefits from remote sensing activities, States are encouraged, through agreements or other arrangements, to provide for the establishment and operation of data collecting and storage stations and processing and interpretation facilities, in particular within the framework of regional agreements or arrangements wherever feasible.

**PRINCIPLE VII**

States participating in remote sensing activities shall make available technical assistance to other interested States on mutually agreed terms.

**PRINCIPLE VIII**

The United Nations and the relevant agencies within the United Nations system shall promote international cooperation, including technical assistance and coordination in the area of remote sensing.

**PRINCIPLE IX**

In accordance with article IV of the Convention on Registration of Objects Launched into Outer Space and article XI of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, a State carrying out a programme of remote sensing shall inform the Secretary-General of the United Nations. It shall, moreover, make available any other relevant information to the greatest extent feasible and practicable to any other State, particularly any developing country that is affected by the programme, at its request.

**PRINCIPLE X**

Remote sensing shall promote the protection of the Earth's natural environment.

To this end, States participating in remote sensing activities that have identified information in their possession that is capable of averting any phenomenon harmful to the Earth's natural environment shall disclose such information to States concerned.

**PRINCIPLE XI**

Remote sensing shall promote the protection of mankind from natural disasters.

To this end, States participating in remote sensing activities that have identified processed data and analysed information in their possession that may be useful to States affected by natural disasters, or likely to be affected by impending natural disasters, shall transmit such data and information to States concerned as promptly as possible.

**PRINCIPLE XII**

As soon as the primary data and the processed data concerning the territory under its jurisdiction are produced, the sensed State shall have access to them on a non-discriminatory basis and on reasonable cost terms. The sensed State shall also have access to the available analysed information concerning the territory under its jurisdiction in the possession of any State participating in remote sensing activities on the same basis and terms, taking particularly into account the needs and interests of the developing countries.

**PRINCIPLE XIII**

To promote and intensify international cooperation, especially with regard to the needs of developing countries, a State carrying out remote sensing of the Earth from space shall, upon request, enter into consultations with a State whose territory is sensed in order to make available opportunities for participation and enhance the mutual benefits to be derived therefrom.

**PRINCIPLE XIV**

In compliance with article VI of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, States operating remote sensing satellites shall bear international responsibility for their activities and assure that such activities are conducted in accordance with these principles and the norms of international law, irrespective of whether such activities are carried out by governmental or non-governmental entities or through international organizations to which such States are parties. This principle is

without prejudice to the applicability of the norms of international law on State responsibility for remote sensing activities.

**PRINCIPLE XV**

Any dispute resulting from the application of these principles shall be resolved through the established procedures for the peaceful settlement of disputes.